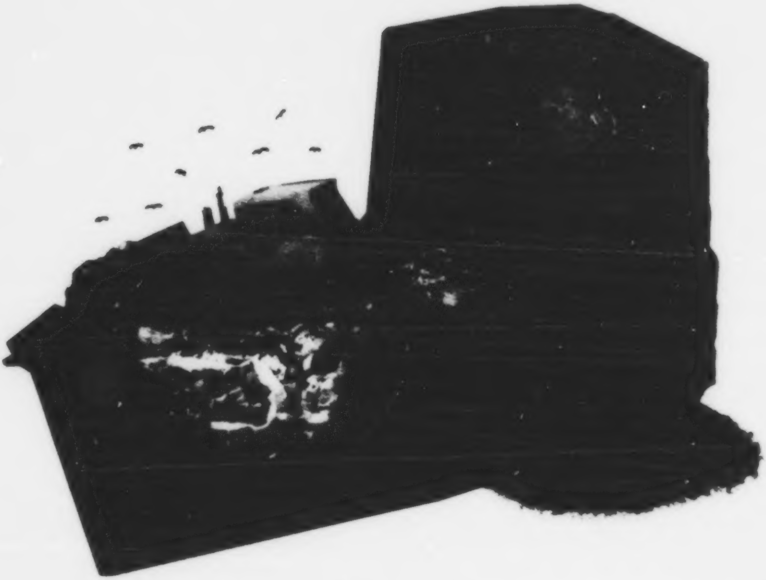
National Round Table on the Environment and the Economy
Table ronde nationale sur l'environnement et l'économie

THE NATIONAL WASTE REDUCTION HANDBOOK



Foreword by
David Sutherland-Yoest
with a message from the
Federation of Canadian Municipalities

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The National Waste Reduction Handbook

An Introduction to Source Reduction & Recycling for Municipal Decision-Makers

National Round Table on the Environment and the Economy
Table ronde nationale sur l'environnement et l'économie

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Foreword

New legislation and an environmentally informed public are transforming the waste business. Canadians are embracing waste minimization, recycling and composting with enthusiasm. From St. John's to Victoria BFI is moving ahead on many fronts, and non-traditional activities, such as recycling and yard-waste composting, have become important, growing components of our business.

Sustainable Development is an idea first given wide visibility during the deliberations and findings of the World Commission on Environment and Development. There are many definitions of this critical term but, simply stated, Sustainable Development means economic activity that increases prosperity without the destruction of the environment from which all prosperity ultimately derives.

From the standpoint of the average citizen in Canada, it also means recycling. Recycling stands in both the substantive and symbolic front lines of sustainability in Canada today. It is substantive because it directly supports the overall aim of the movement toward sustainability in the developed world, which is to reduce the amount of materials that enter and exit the economy so as both to avoid the environmental costs of extracting and processing virgin materials *and* reduce the amount of valuable materials we waste. It is symbolic because it engages large numbers of citizens.

This symbolic aspect of recycling is good in the long run; it demonstrates that the major changes in our economic life that will be required to build a sustainable economy enjoy widespread support. But in the short run, unfortunately, the symbolic aspect of recycling and the personal and political enthusiasm it has stirred up, threatens to overwhelm the substantive ability of our economy to cope with the new magnitude of the materials available for reclamation.

Innovative changes in how we collect and recycle material requires integration of these new approaches with initiatives to process recyclable materials and to secure supportive markets for them. We continually keep abreast of technological advances in mechanized sorting of dry recyclables and organic waste processing which can be utilized economically and environmentally in the provision of our waste minimization services in Canada.

The men and women of BFI also look beyond technological advances and commercial obligations to personal values. We are parents, siblings, sons and daughters in our communities. We share our neighbours' concerns for the protection of the environment so we join other Canadians in formulating long term solutions for waste minimization.

Our mission is to provide the highest quality waste collection, transportation, processing, disposal and related services to both public and private customers worldwide. We intend to carry out our mission efficiently, safely and in an environmentally responsible manner with respect for the role of government in protecting the public interest.

David Sutherland-Yoest
President
Browning-Ferris Industries Ltd

Preface

The National Round Table on the Environment and the Economy, reporting to the Prime Minister, has a special catalytic role to play in Canadian society in promoting Sustainable Development - meaning harmony over the long term between our environment and our economy.

Among the critical areas selected by the Round Table for early attention is the mounting problem of solid waste in Canada. The goal is a sustainable waste management situation in which the generation of solid waste does not impede the ability of our environment to maintain itself in a healthy condition, and in which the costs borne by all sectors of society to reduce what has to be disposed of as waste, combined with the disposal of what remains, are kept to a minimum in a manner consistent with a strong economy.

Clearly there is an enormous need to reduce waste in Canada and a great opportunity to do so in ways that are both environmentally and economically responsible.

In 1988, the Canadian Council of Resource and Environment Ministers (CCREM) took an important step in this direction when it established a target to reduce the disposal of solid wastes 50 percent by the year 2000. The National Round Table will do what it can within its catalytic role to help achieve that aim.

Municipalities are major players in the quest to reach this target. At least as much as any other sector of Canadian society, municipalities confront the problem of waste disposal. They are also at the forefront in the development of ways to divert materials from reaching the waste disposal stage.

In putting together this handbook, the National Round Table is indebted to the Federation of Canadian Municipalities for its participation, which has enabled us to draw from the experiences of municipalities across the country.

This book is offered to municipalities to provide guidance and encouragement to their waste reduction efforts. I hope its users will find it helpful.

George Connell
Chair
The National Round Table
on the Environment and the Economy

A Message from the Federation of Canadian Municipalities

The Federation of Canadian Municipalities was pleased to have participated with the National Round Table on the Environment and the Economy in the development of the National Waste Reduction Handbook.

The handbook is intended to guide municipalities in devising a waste management strategy. It focusses primarily on source reduction and recycling and illustrates success stories of leading Canadian municipalities.

In responding to members' concerns on the environment, FCM has adopted a comprehensive policy dealing with air, water and waste management. With the diminishing capacity of landfill sites, waste management has become a priority for municipalities of all sizes. We hope that this handbook can assist you in devising a strategy that is right for your community.

Doreen Quirk
President

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Introduction

A Message to Local Decision-Makers

During the 1980s, solid waste became a major public issue in Canada. Across the country, expanding volumes of solid waste and growing concern about where to dispose it forced public leaders to view waste from a new perspective. It became clear that the "out of sight, out of mind" waste management solutions of the past would no longer work. As a result, a variety of alternative waste management strategies were tested.

With the arrival of the nineties, Canada has entered a new era in waste management. Many of the "alternative" waste management strategies developed in the last decade are rapidly becoming the norm. Over the next ten years, the nation is likely to see major restructuring of its municipal solid waste management systems. New programs and initiatives, many of them centered around source reduction, recycling and composting, will be set into motion, involving the active participation of government, industry, communities and individual citizens.

While important new policies will likely be enacted at the national and provincial level, a large share will be local. Municipal decision-makers will be called upon to develop new local waste management strategies that help divert large quantities of waste from local or regional landfills. This will involve selecting specific programs and activities from a hierarchy of waste management options which best match local needs, conditions and resources.

Among these options, source reduction and recycling programs, including backyard and municipal composting, will be at centre stage. Recycling alone - whether it involves curbside collection of recyclable materials, multi-family recycling programs, commercial and institutional recycling collection, drop-off depots, materials processing facilities, market development activities, or procurement of recycled products - represents an entire field unto itself, full of options to choose from and decisions to be made. Source reduction programs will offer new and important options to reduce the amount of waste requiring recycling or disposal in the first place.

This handbook is intended to serve as a starting point for Canadian municipalities in investigating such options. The purpose is to support local decision-makers in determining whether their communities should become involved in source reduction and recycling, when to set up such programs, and how to go about their development.

Chapter 1 provides a brief overview of the growing national imperative for waste reduction in Canada, major driving forces that are promoting source reduction and recycling programs at the local level, related national and provincial policy developments, and the role of municipalities in developing recycling.

Chapter 2 provides an overview of source reduction and its potential for increasing waste diversion in Canada. It begins by defining source reduction and describing general source reduction measures and specific activities. It then examines new source reduction developments at both the national and provincial levels, and discusses the emerging role for municipalities in promoting increased source reduction.

Chapter 3 discusses the primary elements of recycling program design, focusing on basic program options and key decisions. It examines the major waste generation sectors found in most communities, identifies the main components of municipal waste, discusses recyclable materials, and reviews options for market development, materials processing and collection, and education and promotion. Municipal composting programs are also addressed.

Chapter 4 provides a summary of government agencies and other organizations around the country that are available to provide support to municipalities in establishing recycling programs. A listing of relevant publications is also provided.

Overall, this handbook emphasizes the premise that each municipality represents a unique set of conditions, and must determine by itself, or in conjunction with neighbouring jurisdictions, which options to pursue. The intent is not to present a single national "solution" to the solid waste dilemma faced by local communities, because there is probably no such thing. Instead, it seeks to serve as a national level resource, providing useful information and positive examples from across the country that can be helpful in assessing recycling options at the local level.

Throughout this handbook, examples of existing recycling "success stories" are profiled. The purpose is not so much to laud the efforts of specific municipalities or provinces, but rather to underscore the great breadth and scope of programs from which other municipalities can learn. Contact names are provided for each of the programs highlighted, so that additional information may be obtained.

If your municipality is ready to roll up its sleeves and begin the development of a local source reduction or recycling program, this handbook can help start the process. If, on the other hand, your municipality is just beginning to assess where it might go, this handbook might be considered a kind of road map for identifying the types of choices and decisions that lie ahead.

1 Overview

Municipal Solid Waste and Municipalities in the 1990s

Throughout the postwar period, the volume of solid waste produced by residential, industrial, commercial and institutional generators in Canada grew steadily. For the most part, the nation's trash was seen as a necessary by-product of our prosperous, industrial, high consumption way of life - unfortunate perhaps, but cheaply disposed of and easily forgotten. Despite long established efforts by some industries to re-use or recycle certain materials, and a few isolated government and community-based initiatives to reduce, re-use or recycle post-consumer wastes, the nation's mountain of garbage continued to grow.

During the last decade, however, Canada began to come to grips with its solid waste dilemma. Faced with increasingly complex waste management issues, Canadians acknowledged that the issue of solid waste was no longer one that could be buried. Source reduction and recycling emerged as viable options in waste management. Today, recycling (including municipal composting) is considered one of the major tools available to local communities in redirecting materials, that would otherwise end up in local landfills, to more productive uses. There is a growing potential, however, for source reduction programs at both provincial and municipal levels.

A number of driving forces have combined to promote source reduction and recycling at the local level as a major waste management strategy for municipalities. These include:

- ***Declining capacity in the nation's landfills.***
  Many landfills are rapidly approaching capacity or threatened with closure because they fail to meet increasingly strict environmental standards. The result is declining disposal space available at a higher cost. In some municipalities the landfill capacity situation has become acute. There is additional strain on the capacity of landfills to absorb toxic or hazardous materials without posing grave threats to land, air and groundwater. Source reduction and recycling offer practical methods for extending the life of existing landfills by decreasing the volume and toxicity of materials flowing into them.

- ***Rising cost of waste collection and disposal services.***
  Increased disposal costs at local or regional landfills means that it is becoming more expensive to collect and dispose of our waste. With these increased costs, there are greater incentives for municipalities to seek out cost-effective alternatives to traditional collection and disposal methods. Source reduction and recycling can save on the cost of disposal. In some cases, recycling and municipal-scale composting can also generate additional revenues through the sale of recycled materials

or compost products.

- ***Public attitudes toward the environment.*** Public concerns over the quality of our environment and the safety of current waste disposal practices, together with preferences for less wasteful lifestyles, have created a major, grassroots political force that is pushing for local source reduction and recycling programs, and other forms of Sustainable Development. Residential source reduction and recycling, in particular, provides families and individuals with a constructive, hands-on opportunity to have a direct and positive impact on the environment. Residents who reduce or recycle waste are taking their penchant for action into the workplace, resulting in an increased demand for business and institutional participation in similar programs.

- ***Regionalization of waste management.*** As older, substandard landfills or scattered dumping sites are phased out or permanently closed, they are replaced by modern regional disposal sites or incineration/energy recovery facilities that are often built to serve more than one community. Such regionalization is helping to promote the development of new waste management infrastructures, growing municipal co-operation and better economies of scale capable of supporting increased local recycling. Co-operative processing of recyclables collected by a number of municipalities is a prime example of the regionalization of recycling.

- ***National and provincial policy.*** Source reduction and recycling policies and programs are being developed nationally and provincially by both government and the private sector. The Canadian Council of Ministers of the Environment (CCME - formerly CCREM), for example, has adopted a national waste reduction goal of 50 percent diversion of solid waste from the nation's landfills by the year 2000. The development of comprehensive source reduction and recycling programs at the local level offers municipalities the opportunity to make a direct and significant contribution to the attainment of this national diversion goal.

All of these trends are converging at the local level, where municipalities are taking action by designing and implementing source reduction and recycling programs. Such efforts are rapidly taking their rightful place at the top of a 'hierarchy' of waste management strategies available to local communities. Along with incineration/energy recovery and landfilling, they offer municipalities a potentially integrated waste management system capable of reducing, re-using, recycling, transforming and/or ultimately disposing of the nation's waste into the next century.

The success of source reduction and recycling programs in ensuring that our waste management practices are environmentally and economically sustainable, depends upon actions that are taken at the local level. Along with national and provincial source reduction and recycling efforts, municipalities have a major role to play in ensuring that this potential is realized. The National Waste Reduction Handbook is designed to help municipalities become involved in evaluating their potential for source reduction and recycling, and therefore to make informed and intelligent decisions along the way.

Remember, if we don't reduce or recycle it, we're throwing it all away!

Notes

2 Source Reduction

New Options for Waste Diversion

Source reduction, the reduction of waste at or near the source of generation, is considered one of the most important and promising strategies for reducing the growing volume of solid waste in Canada. The rationale is simple: the less waste generated, the less waste there is to dispose. When waste generation is reduced, fewer waste materials need to be handled - and less money and time need to be invested in other, more complicated waste management options.

As a "front-end" solution, source reduction is the most simple, direct form of waste diversion. As an environmentally sound alternative to traditional forms of solid waste management, source reduction represents savings in cost and resources by reducing the need for collection, processing or disposal, as well as related capital, equipment and labour. Everyone, from large manufacturing facilities to individuals in their homes, can do it. This is why source reduction is usually placed at the top of the hierarchy of preferred waste management strategies (higher than recycling), even though it is not technically considered a form of solid waste management.

A significant, though not easily quantifiable, portion of Canada's waste could be eliminated through source reduction. The relative success of such a strategy is determined by the willingness of government, the private sector, and citizens-at-large to become actively involved in source reduction programs. Already, source reduction figures prominently in national and provincial waste diversion strategies and initiatives, and private industry is starting to consider the integration of such strategies into its own practices. Given such trends, it is clear that source reduction will gain further importance as a major waste diversion strategy in the coming decade.

Despite this potential, source reduction remains the least developed option in the waste management hierarchy. This is particularly true at the local level where the number of established source reduction models are limited. Comprehensive municipal programs for source reduction are only now being developed, and few municipalities have attempted to measure the impact of their source reduction actions on local waste diversion.

However, this situation is changing rapidly. Increasingly, municipalities are looking to source reduction as an appropriate first step in the waste diversion process and as an integral part of their overall waste management programs and activities. National source reduction directives and provincial policies promise to continue to stimulate municipal interest. Gradually, an appropriate municipal role in promoting source reduction is beginning to emerge.

The purpose of this chapter is to provide an overview of source reduction and its potential for increasing waste diversion in Canada. The first section begins with an operative definition of source reduction, a description of general source reduction measures and specific activities, and a discussion of the program's general strengths and weaknesses as an option for increased waste diversion.

The following section examines recent source reduction developments at the national level, including the issue of packaging. It then proceeds to discuss provincial-level policy developments which promise to intensify source reduction as a waste management strategy in the 1990s. The final section provides an overview of the emerging municipal role in source reduction, and examples of potential actions which could be taken by local municipalities in reducing their waste.

In reviewing this information, it is important to note that source reduction is a dynamic and rapidly changing target. What source reduction means, who should be doing it, and what actions they should undertake is currently the subject of an intense dialogue. A year ago, much of the information included here might not have been available; similarly, by next year important new developments could add to our pool of knowledge. The point is that all levels of Canadian society and its various institutions have a chance to engage in this dialogue.

What *Is* Source Reduction?

While some people may be familiar with the basic concept of source reduction, many have difficulty putting a finger on the specific activities it implies. Unlike recycling, which has had a ten to fifteen year head start, source reduction is an unfamiliar entity in the public eye. It is obvious that more research, education and promotion on the topic are needed. There is also a need for a clearer consensus on the language of source reduction, including the meaning of such closely related terms as waste reduction, source reduction, and re-use. Currently, such a consensus does not exist.

For the purpose of this handbook, *source reduction* is defined as the design, manufacture, purchase and/or use of products and materials in a manner that minimizes or eliminates the volume of the resulting waste requiring disposal. As the word "source" denotes, source reduction means waste reduction actions taken close to the source of waste generation, i.e., the point at which changed behaviour or direct action can reduce the volume of waste generated and ultimately disposed. Source reduction actions may be taken during the manufacturing of products, or applied further downstream, during the marketing, distribution, consumption, or re-use of those products.

Sometimes the term *waste reduction* is used interchangeably with source reduction. However, waste reduction is also used in a broader context related to *waste diversion*, implying a number of related activities, including source reduction, re-use and recycling. Given this broader definition, source reduction would be considered a form of waste reduction, but the reverse would not always be true. On the other hand, source reduction is often defined to include *re-use*, or those activities that extend usable life of a specific product or material. In reality, there are fine lines of difference between all these terms, and the ultimate objectives of the activities they describe are very similar.

Source reduction includes general measures such as:

1 Reducing product volume,
2 Extending product life,

3 Minimizing product packaging and toxicity,
4 Purchasing products selectively,
5 Promoting product re-use, and
6 Decreasing product consumption.

These measures can be applied through the manufacturing processes and product specifications of manufacturers; through the operational standards and procurement practices of businesses and institutions; and consumer and life style decisions of individuals and communities.

General Source Reduction Measures

- **Reducing product volume**
- **Increasing product life**
- **Reducing product packaging**
- **Purchasing products selectively**
- **Promoting product re-use**
- **Decreasing product consumption**

The following examples, while not all-inclusive, provide an idea of how application of source reduction measures can reduce solid waste materials throughout society.

- ***Product manufacturers can:***
  1 Enhance the quality and durability of a specific product,
  2 Reduce or eliminate the product's disposable elements,
  3 Reduce the quantity of materials used for packaging and distribution, and
  4 Promote the product's re-use/repair as opposed

to early disposal.

Sample actions in the area of packaging and distribution might include:

Increasing packaging efficiencies
Decreasing the number of packaging materials
Lightweighting packaging materials
Substituting packaging materials
Re-using / remanufacturing shipping pallets
Re-using shipping containers
Re-using shipping materials (e.g. polystyrene packing "peanuts")

- ***Businesses and institutions can:***

1 Develop standards encouraging reduced volume, durability and re-use of purchased products,
2 Implement co-operative purchasing or materials exchange programs,
3 Develop source reduction requirements for internal operations, and
4 Promote increased employee or constituent involvement in source reduction options.

Sample actions in the area of internal operations might include:

Reducing internal paper consumption
Re-using internal mail distribution envelopes
Promoting double-sided copying and printing
Using refilled or remanufactured toner cartridges
Promoting electronic mail and modem transmissions over hard copy

Replacing disposable cups with ceramic mugs
Replacing paper towels with air dryers

- ***Individuals and communities can:***
  1. Promote increased source reduction through personal lifestyle changes that include selective product purchasing, product re-use and decreased consumption.
  2. These activities may further be promoted through neighbourhood and environmental groups, public involvement programs, or the ballot box.

  Specific examples set by individuals might include:
  Purchasing items that minimize unnecessary packaging
  Purchasing food items in bulk or larger packaged volumes
  Replacing paper towels and napkins with cloth items
  Using refillable or re-usable food and household product containers
  Replacing disposable grocery bags with re-usable shopping bags
  Composting food and organic wastes at home
  Renting or sharing tools and other limited use household items
  Donating used clothing, furniture and household items
  Refusing unsolicited junk mail

It is important to note that each of these source reduction actions may have specific pros and cons which must be assessed before their

desirability can be assured. Sometimes, reducing waste at the source may involve other economic or environmental costs.

For example, an emerging issue in the field of packaging concerns source reduction properties of particular packaging options versus their recyclability; lighter, more space- and energy-efficient materials may also be less recyclable.

Closer to home, choosing re-usable products over disposable ones (cloth diapers, for example) raises questions concerning the water- and energy-consumption properties of re-usable product versus the hygienic properties or recyclability of disposable ones.

Strengths and Weaknesses of Source Reduction

Strengths:

- **Offers significant waste diversion potential**
- **Avoids unnecessary waste collection, processing and disposal**
- **Avoids need for secondary market development**
- **Saves money and conserves resources**
- **Offers easy actions for all sections of society**
- **Involves actions at national, provincial and local levels**

Weaknesses:
- **Waste diversion impact is difficult to measure**
- **Public familiarity with specific actions is limited**
- **Costs and benefits of specific actions must be considered**
- **May have environmental or economic costs**
- **National and provincial policy still evolving**
- **Municipal experience limited**

Analyzing general source reduction measures with regard to cost or the environmental impacts of specific actions is far beyond the scope of this handbook. Indeed, it is a field of inquiry that is only beginning to be defined. However, municipal decision-makers should be aware that, source reduction does raise significant issues which must be explored further. Not all source reduction actions are cost-free. Each must be considered on the basis its own merits and potential impacts. The dialogue in Canada concerning the desirability of specific source reduction actions is bound to increase over the next few years.

National Developments in Source Reduction

Currently, the main focus on source reduction in Canada is at the federal and provincial levels. Federal and provincial officials are working on the development and implementation of policies designed to increase source reduction measures and activities, with major emphasis on the issue of packaging.

Nationally, one of the most visibly prominent venues for source reduction activity has been through the *Canadian Council of Ministers of the Environment* (CCME), whose membership brings together the nation's leading environmental officials. In 1988, in a major initiative designed to encourage increased waste diversion, CCME (formerly CCREM - *Canadian Council of Resource and Environment Ministers*) set a goal of reducing the quantity of packaging waste sent to the nation's landfills by 50 percent by the year 2000.

The CCME goal is intended to be met, half through source reduction measures (including all forms of re-use) and half through recycling measures. There is, however, considerable latitude in this directive. For example, it is left unspecified whether the 50 percent goal is intended to be measured by the reduction and/ or recycling of specific types of products, the reduction or recycling of types of packaging, or the reduction and recycling activity of packaging companies or operations.

In order to co-ordinate action towards meeting this goal, Environment Canada has chaired the *National Task Force on Packaging* (NTFP), which includes representatives from government, industry, consumer and environmental groups. The NTFP has developed the *National Packaging Protocol* (NAPP), an initiative that is receiving widespread attention across the county.

A number of projects relating to Packaging Protocol have already been undertaken. Work in progress or recently completed includes:

1 Development of a *national packaging database*, including the types, amount, and value of packaging produced, used, recycled and disposed in each province;
2 A *communications strategy* for public information on packaging issues;
3 A *review of jurisdictional authoritiy and existing legislation* on packaging in Canada;
4 The *identification of the existing infrastructure*; and
5 The development of *recommended packaging policies*.

The policy development element has resulted in the recommendation of six basic national packaging policies, as follows:

1 All packaging in Canada should have minimal effects on the environment.
2 Priority will be given to the management of packaging through source reduction, re-use and recycling in that order.
3 An ongoing campaign of information and education will be undertaken to make Canadians aware of the function and environmental impacts of packaging.
4 These policies will apply to all packaging used in Canada, including imported packaging.
5 Regulations will be implemented as necessary to achieve compliance with these policies.
6 All government policies and practices affecting packaging will be consistent with these national policies.

NAPP also has an ambitious implementation program for 1991-1992. Included in its agenda are the following elements:

- Development of a framework for environmental lifecycle analysis
- Development of environmental profiles of specific types of packaging
- Review and assessment of government policies and practices which impede the achievement of the Protocol
- Development of industry packaging action plans
- A process assessment methodology and actual assessment of Protocol implementation
- Secondary/post-consumer content standards for packaging
- Government policies to support the Protocol's initiatives
- Examination of international trade and the Protocol
- Packaging research and development priorities and related business opportunities
- Identification and demonstration of appropriate new technology and packaging practices
- Educational programs for use in schools
- Identification of economic support initiatives

Clearly, the scope and breadth of the National Packaging Protocol Action Plan is unprecedented. If only a portion of the policies and actions it recommends are successfully implemented, they may permanently change the way the nation produces, uses, recycles, disposes and fundamentally thinks about packaging.

Already the Protocol is reverberating throughout Canada's manufacturing and packaging industries. The resulting long-term impact on source reduction and solid waste diversion in Canada could be profound.

Industry, Packaging and Source Reduction

There are two major kinds of industries in Canada that will be affected by the National Packaging Protocol and related initiatives: (1) the *manufacturers of products* and (2) the *manufacturers of packaging materials.*

Within some of these industries, certain forms of source reduction have been practised for years. For example, the re-use of beverage containers (i.e. returnable, refillable bottles) is a long-standing form of source reduction. More recently, some industries and firms have turned to lightweighting and related packaging developments, for a variety of reasons - including source reduction. On the other hand, other industries and firms have been noticeably slow in coming to terms with the nation's solid waste crisis or the role that their own products and packaging have played in promoting waste.

Two emerging issues now confront major Canadian manufacturers and users of packaging. The response to these issues will have a significant effect on the future of packaging. These issues are:

1 How will the emerging federal mandate on source reduction and packaging affect industrial interests? Will stringent new packaging guidelines or requirements place a burden on all industry equally, or will they provide certain industries and firms with

competitive advantages? Should industry attempt to resist such changes - or should it seek to gain competitive advantage by taking this initiative into its own hands?

2 In which fundamental direction should industry lean: toward an emphasis on increased source reduction or increased recyclability? For example, which product will be considered more environmentally correct: a pound of coffee packed in a multi-layer, lightweight and easily disposable aseptic package - or the same coffee packed in a single-layer, heavier, but easily recycled tin can?

Beyond manufacturers of products and packaging, other industries in Canada are beginning to develop new corporate policies and strategies that incorporate source reduction objectives. McDonald's Canada, for example, claims to have achieved weight and volume reductions of up to 25 percent by lightweighting its packaging and reducing shipping container needs by shaping them for greater space efficiency.

Other firms are developing source reduction as an element of their product and packaging procurement standards. For example, British Columbia Telephone Company has a new corporate policy for its purchasing department that includes environmental requirements for both products and packaging. In addition to requiring environmental information from suppliers, the company is looking for opportunities to obtain bulk supplies and return emptied containers.

These examples represent only a sampling of what promises to be a long-term, fundamental shift in corporate policy regarding the promotion of source reduction. Again, the impact on the nation's waste stream could be profound.

Provincial Source Reduction Initiatives

While the national dialogue on packaging has created a driving force for source reduction in the manufacturing and packaging industries, a number of provincial governmental initiatives on source reduction are also beginning to appear. Among these initiatives, legislation recently passed in Manitoba represents one of the most far-ranging governmental policies on source reduction to date.

In 1989, Manitoba's *Waste Reduction and Prevention Act* (WRAP) set a 50 percent waste minimization goal for the province. Significantly, this act places the burden of effort on the *producers* of designated products and materials. Through the potential use of regulatory mechanisms and economic disincentives, the province has given industry the direct signal that it must actively pursue both source reduction and recycling. Manitoba's process for achieving increased waste reduction and prevention consists of six major elements:

1 The Minister of Environment will develop an overall source reduction and recycling strategy, to be updated on an annual basis. *This strategy includes:*
  - a report on activities of the previous year
  - an analysis of the Manitoba waste stream
  - an analysis of the potential for source

reduction and prevention
- an identification of target products and materials

2 The Environment Department, in consultation with producers and consumers, will develop specific waste minimization goals for products and materials targeted in the strategy.

3 Producers of designated products and materials are asked to develop and execute plans for achieving the targets in an environmentally safe and effective manner. The Department will review these plans.

4 If it is "not possible for producers to develop and execute acceptable plans", the Department may select specific regulatory incentives to reduce and prevent waste. Its analysis must consider the criteria of efficiency, effectiveness in meeting a target, and administrative costs. *Options may include:*
- Deposit
- Predisposal Fees (a.k.a. advanced disposal fees)
- Licensing
- Performance Bonds
- Excise Tax
- Bans

In this way, industry will be given the opportunity to provide source reduction initiatives and reform as a method of avoiding government regulation of their products.

5 Manitoba Finance will administer an Environmental Innovations Fund, in addition to revenues generated through regulatory actions, to provide financial support for community and industry initiatives.

6 The Environment Department, in consultation with producers and consumers, will monitor the annual progress towards the 50 percent goal. This will be used to determine necessary next steps and annual revision of the WRAP strategy.

Manitoba is expected to establish four priority target areas for action on source reduction and recycling, including:

1 Beverage containers,
2 Newspaper publishing,
3 Used motor oil, and
4 Tires.

Along with *Manitoba*, other provinces have taken initiatives in the area of source reduction. These actions are particularly focussed on beverage container manufacturers.

Ontario's Ministry of the Environment has promised to hold the province's beverage container industry to its stated goal that a specified percentage of its product line will be bottled in refillable containers.

In *New Brunswick*, a bill is currently under consideration that would set a variable deposit on beverage containers, banning containers which are not refillable or recyclable.

In *Saskatchewan*, deposits are applied to aluminium cans, non-refillable glass bottles and PET plastic bottles used for carbonated soft drinks and alcoholic beverages. The rate of deposit varies according to the material and size of the container.

Finally, in the *Yukon Territory*, the Yukon Liquor Corporation will soon offer bulk wine sales at territorial liquor stores.

Municipal Source Reduction Activities

If the actions that are emerging in the federal and provincial arenas take hold, they will have significant impact on waste diversion at the local level. At the same time, the question must be asked: What can municipalities do to promote source reduction? While industry initiatives and government policies may be more effective if promoted nationally or provincially, municipalities, too, can play an active role in making source reduction happen locally. The exact nature of that role is only now beginning to develop.

Emerging Source Reduction Roles

- **Providing Information, education and technical assistance**
- **Developing financial incentives and disincentives**
- **Enforcing regulations and standards**

Municipalities can promote source reduction by designing programs under three general headings: *information, education and technical assistance*;

economic and financial incentives / disincentives; and *local regulation*. These are briefly outlined and discussed in the following pages.

Information, education and technical assistance programs can provide basic information and assistance for voluntary source reduction efforts by private citizens, businesses and institutions. As mentioned earlier, many of the actions taken by individual citizens relate to personal lifestyles and choices.

Municipally distributed information can focus on simple source reduction measures that can be put into practice by individuals in their home, offices or factory settings. Such messages can easily be incorporated into ongoing recycling promotion and educational activities. *An example is set by the Essex-Windsor campaign implemented in 1990 (see end of this chapter).*

Technical assistance can also be provided to local small businesses, institutions and community groups. Education and technical assistance programs set up to promote recycling can be expanded to include source reduction elements. Sample education and technical assistance programs might include:

- Waste audits for businesses

- Assistance with on-site composting and mulching

- Non-procurement source reduction activities (in-house programs, school and other city department programs)

- Source reduction demonstration programs

- Assistance with waste exchanges

Financial incentives/disincentives, such as tax credits for business source reduction measures or product taxes on excessive packaging may provide unique opportunities at the municipal level. Such strategies include variable can rates or disposal charges designed to discourage residents or businesses from generating additional volumes of waste. Variable rate structures may be based on the number of containers set out, frequency of collection provided, or other similar criteria. Additional economic incentives/ disincentives might include:

- Local waste disposal fee modifications (raise the tip fee or place a surcharge or tax on garbage/recycling services)

- Provide loans, grants and loan guarantees for research or the purchase of source reduction equipment (a dishwasher for a school or a duplex copier)

- Deposits, refunds, and rebates (applicable to toxicity reduction and other difficult wastes, such as tires and auto bodies)

- Financial incentives for the sale of source reduction items or source reduction activities in the business place

Regulations and standards to promote source reduction, while most appropriate at the provincial or federal level, can also be promoted by municipalities.

A major example of locally enforceable regulations would include restrictions or outright bans on the landfilling of certain re-usable, recyclable or hazardous waste products, such as wood waste, automobile tires and lead-acid batteries.

In addition to providing incentives for the recycling of certain materials, such restrictions can also provide indirect incentives to reduce waste generation at the source.

Sample local regulatory programs might include:

- Procurement ordinances favouring durable, source-reduced, recycled content, and/or recyclable purchases
- Requirements for source reduction plans by local businesses
- Local product and packaging bans

While still in a developmental stage, municipal source reduction programs are bound to continue their expansion.

Promoting Source Reduction in Essex-Windsor

The County of Essex-Windsor in Ontario is currently pushing the boundaries of municipal involvement in waste (source) reduction with a new, two-phase promotion/education campaign.

Phase one of the Essex-Windsor campaign, developed and implemented in 1990, attempted to explain the basic concept of source reduction to county residents.

Phase two, was due for implementation in the spring of 1991, to promote specific examples of source reduction activities that citizens can undertake themselves.

The phase one effort was actually part of a larger promotion campaign conducted by the County. Part of the campaign ('Recycle Right') was designed to instruct citizens on what should and should not be placed in their curbside recycling containers. The other part ('Make It Happen - Waste Reduction') focussed exclusively on the source reduction concept.

Advertising media employed by the County's source reduction campaign included billboards, bus and transit shelter ads, radio, television, and newspaper ads. Some ads were run as public service announcements. The television ad features a young girl picking up a plastic container, while a voice-over describes the quantity of waste Canadians generate each year and the need to reduce that volume. The camera pulls back to reveal the girl standing in the midst of an immense landfill.

Phase one of the Essex-Windsor campaign was funded by the County ($63,000) and three corporate sponsors: the Miracle Mart retail chain, Heinz Canada, and General Motors Canada. In exchange for their sponsorship of the ad campaign, these companies had their names on all advertisements. City officials report that public response to the first phase of the campaign was mixed. Not surprisingly, a number of questions were asked regarding what waste reduction really means.

Having gained public awareness, phase two of the Campaign focusses on explaining how to reduce waste. One idea being explored is a sixty-second testimonial about the 'garbageless lunch'. * A local public school recently conducted an analysis of its lunch wastes, and encouraged students to bring alternative lunches that generated less waste. The campaign cleverly targeted a concerned audience: Canada's youth.

Essex-Windsor officials would like to see more provincial leadership in source reduction promotion and education. Public education is costly and the province has more substantial resources for the development of attractive, effective promotional and educational materials and programs.

A provincial campaign could be conducted using province-wide media, while making promotional materials available for local use by muncipalities. The County is currently lobbying provincial officials to take a stronger leadership role in this area.

It is difficult to monitor the effectiveness of the Essex-Windsor promotional campaign, not only because it is not yet complete, but also because funds have not yet been allocated to measure campaign results. The advertising campaign itself will take up all of the County's available source reduction budget.

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* *"The Garbageless Lunch" is a registered trademark of*
Environment Watch Products Inc
181 University Avenue, Suite 2200
Toronto, Ontario, M5H 3M7

Notes

3 Recycling and Composting

Basic Options and Key Decisions

Despite the simple image of bottles, cans and newspapers in a container set for curbside pick-up, often associated with municipal recycling, designing a local recycling program can be a complex and challenging task. It involves gathering data on local conditions, examining a range of possible program options, and deciding how to design and implement the preferred options.

Realizing this fact, a municipal decision-maker might be daunted by this challenge. However, with clear information on local conditions, proper orientation to available program options, and useful resources for further assistance, establishing a municipal recycling program represents a fairly straightforward, "do-able" task.

Indeed, appropriate recycling options exist for most municipalities regardless of their size, location, and mix of residences and businesses. From rural communities with limited resources and small volumes of recyclable materials, to large cities with tons of trash and thousands of participants, models for the establishment of effective, successful recycling programs have been tested across the country.

The purpose of this chapter is to provide local decision-makers with a basic orientation to municipal recycling and the fundamental components of recycling program design. The idea is *not* to serve as a "how-to" guide. Rather, it is to provide an overview of basic information and options that should be understood before proceeding with the design of a municipal recycling program. With such an overview in mind, decision-makers should find that the specific "how-to" questions and answers will begin to fall into place.

The chapter begins by examining guiding principles that are common to most recycling programs, regardless of their size or approach. Next, it provides basic descriptions of the major waste generators, waste streams and recyclable materials around which most municipalities will design their programs. It then proceeds, step-by-step, through the basic elements of recycling program design (markets, materials processing, collection systems, and program promotion and education), examining basic options within each of these areas and identifying key decisions that must be made in choosing among them.

In addition to recycling program design, composting is examined as another area of municipal activity. While composting may technically not be considered recycling, it is similar in its basic approach: redirecting recyclable materials away from disposal for further processing and productive new end-uses. It is also highly compatible with recycling in that it offers local communities further opportunities to divert significant volumes of waste from disposal.

Throughout this discussion, numerous examples from a variety of municipal recycling programs across Canada are highlighted. These success stories should provide plenty of evidence that municipalities can achieve well-designed and effective recycling or composting programs.

Guiding Principles for Municipal Recycling

Many options exist for municipalities to establish recycling at the local level. For each option this chapter offers a rationale and specific evaluation criteria to help communities determine whether it is an option suited to local conditions, needs and resources.

This chapter also articulates a number of guiding principles that apply to the design of most municipal recycling programs. By keeping such principles in mind, a municipality can clearly assess the appropriateness of specific options it may consider.

Listed below are seven widely-accepted principles for the design of local recycling programs. They offer a framework from which to begin the program design process.

- ***Integrated Solid Waste Management***
  Recycling programs should be developed to support an integrated approach to solid waste management, taking into consideration the entire hierarchy of waste management strategies.

- ***Waste Management Hierarchy***
  The hierarchy of preferred waste management strategies - including, in order of priority: waste (source) reduction, recycling, incineration/energy recovery, and landfill disposal - should be adhered to whenever possible.

- ***Maximum Waste Diversion***
  Recycling programs should address all major sectors and waste streams and should operate in a manner that diverts as much waste as possible from incineration or disposal.

- ***Program Convenience***
  Recycling programs should provide a level of service that is as convenient as possible for as many sectors of the community as possible.

- ***Program Compatibility***
  Recycling programs should be designed and implemented in a manner that utilizes and supports existing waste management infrastructure and recycling services whenever possible.

- ***Program Adaptability***
  Recycling programs should be designed to be as flexible and adaptable as possible in order to respond to shifting markets, new materials, emerging technologies and changing recycling standards.

- ***Program Cost Effectiveness and Efficiency***
  Recycling programs should be designed and implemented in a manner that is as cost-effective and as resource-efficient as possible.

The list is by no means complete or relevant to all situations. It may be difficult for a program to address all of these principles equally. In reviewing local conditions and resources, municipal decision-makers may find that some principles should be given higher priority, while others simply do not apply to the local situation.

Decision-makers may also articulate additional principles that guide them in the design and implementation of local programs.

Waste Sectors, Waste Streams and Recyclable Materials

Before a municipality can begin to choose among options available to create a local recycling program, it must first develop a comprehensive picture of local conditions affecting solid waste.

These include major waste generators in the community, basic waste streams they generate, and specific recyclable materials generated.

Once such a picture has been established, the municipality can tailor its program choices to fit specific local conditions.

Key Factors: Waste Sectors, Waste Streams & Recyclable Materials

- **Analyze composition of the local waste stream**
- **Identify major waste generator sectors**
- **Determine size and characteristics of major waste streams generated**
- **Prioritize major sectors and waste streams for recycling programs**
- **Target key recyclable materials**

The following section provides a basic overview of *waste generators, waste streams* and *recyclable materials.*

While these descriptions are relevant to most Canadian municipalities, local conditions may vary significantly from one community to the next and these descriptions will not necessarily apply to all municipalities.

Major Waste Generators

Major waste generators that can be targeted for municipal recycling programmes, include both residential and non-residential sources.

Residential generators can be divided into two major categories: *single-family residential* and *multi-family residential.*

Non-residential generators can also be divided into two categories: *commercial/institutional* and *industrial.*

Each sector generates different types and quantities of waste and presents unique challenges and opportunities with regard to municipal recycling programs.

When analyzing waste generators, the size and location of a sector and the nature of the local economy must be considered.

For example, a suburban community may have a high proportion of single-family residential waste generators, while a larger urban centre may have far more multi-family residential, commercial/institutional or industrial waste generators.

Major Waste Generators

- **Single Family Residences:**
    - **Detached Single-Family Residences**
    - **Semi-Detached Residences**
    - **Multi-Family (four or fewer units)**
- **Multi-Family Residences:**
    - **Multi-Family (five or more units)**
    - **Apartments, High-rise Residential**
- **Commercial/Institutional:**
    - **Hotels, Restaurants, Retail Stores, Offices,**
    - **Schools, Universities, Hospitals, Prisons**
- **Industrial:**
    - **Factories, Light Industry, Warehouses,**
    - **Construction Sites**

The single-family residential sector is defined as any residence that places its garbage out for collection on an individual household basis. This generally includes traditional detached single-family houses as well as certain multi-family structures, such as residential complexes that have four units or less.

Most municipal recycling programs begin in the single-family sector because recycling is easily integrated with regular curbside garbage collection. In addition, single-family collection is often provided or regulated by local municipalities.

The multi-family residential sector is any residence that places its garbage in a common storage and collection area with other households. This generally includes most multi-family dwellings with five or more residential units.

Municipal recycling programs normally implement multi-family recycling after single-family recycling is established, because it involves a greater diversity of structures and collection situations, hence efficient collection of recyclables becomes more challenging.

Because of this complexity, multi-family recycling is often provided by private waste haulers and municipalities may need to work more closely with the private sector to integrate this process with their regular garbage collection.

Despite any difficulties, multi-family recycling may represent an important program opportunity for some municipalities, depending on their housing mix.

The commercial/institutional sector (also known as the commercial sector) includes offices, retail stores, hotels, restaurants, and entertainment centres, as well as hospitals, schools, universities, prisons and other public and private institutions.

Not surprisingly, this sector accounts for a major portion of the municipal waste stream, as well as a number of potentially valuable recyclable materials. These factors alone make the commercial sector an important potential target for municipal recycling programs.

However, the commercial sector presents a greater challenge in setting up recycling programs due to the great diversity of commercial waste generators and the distinctly different materials that are generated from one site to the next. In addition, collection of waste from the commercial sector is often provided by private haulers.

Despite these challenges, commercial recycling represents a major opportunity for municipalities seeking to maximize waste diversion.

The industrial sector includes factories, light industry, warehouses, distribution centres, and similar establishments.

Like the commercial/institutional sector, this sector constitutes a wide variety of diverse waste generators and specific materials, although the type and mix of recyclables generated may differ significantly from typical commercial sector recyclables.

Industrial waste generators are also typically serviced by private haulers.

Major Recyclable Waste Streams

The term *waste stream* describes the total flow of solid waste that must be recycled or disposed of through incineration or landfilling.

A waste stream can be sub-classified by the groups that generate it or the specific materials flowing through it.

Municipal waste stream, for example, refers to the flow of waste generated within a given municipality or group of municipalities, while *residential waste stream* refers to the flow of waste generated by the residential sector.

Recyclable waste stream, on the other hand, refers to the flow of materials that can be recycled.

Major Recyclable Waste Streams

- **Dry recyclable materials:**
  paper, glass, metals,
  plastics (some varieties)
- **Yard waste:**
  leaves, grass clippings prunings,
  yard and garden organic matter
- **Food waste:**
  Residential food wastes,
  commercial sector food wastes
- **Special recyclable wastes:**
  Lead acid batteries,
  household batteries
  (some varieties),
  used motor oil, automobile tires,
  white goods (used appliances)

Generally, the municipal waste stream can be divided into five component waste streams: *dry recyclable materials, yard waste, food waste, special wastes* and *garbage* - or the remaining disposable fraction.

All of these waste streams are generated by the single-family, multi-family, commercial and industrial sectors, albeit in differing quantities and proportions.

Three of these waste streams - dry recyclables, yard waste and food waste - form the bulk of the recyclable waste stream. Some special wastes are also capable of being recycled.

Dry recyclable materials represent the so-called "dry fraction" of the recyclable waste stream. These are the materials (paper, glass, metals, etc.) that usually come to mind when we think of recycling and which are collected by most curbside or commercial recycling programs.

Yard waste and food waste represent the organic or "wet fraction" of the recyclable waste stream.

These are the materials that provide potential feedstocks for municipal composting programs and similar end-uses. (For more information on this see "Composting Program Options", p.84).

In addition to common household hazardous wastes, ***special wastes*** includes some materials with recycling potential, such as motor oil, tires and white goods (e.g., household appliances).

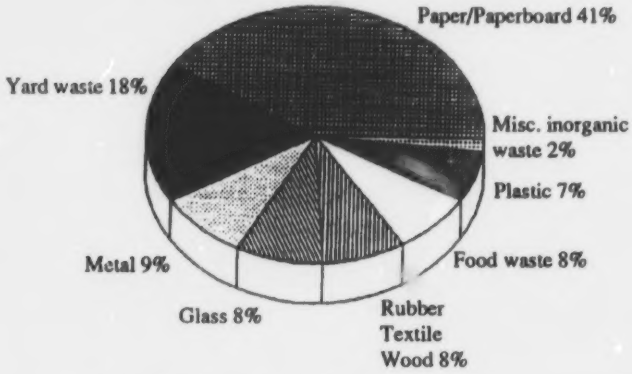
Based on volume alone, the waste diversion opportunities offered by these waste streams is impressive.

While accurate national data on the composition of municipal waste in Canada are not currently available, comparable data (based on *weight*) for the United States indicate that the major recyclable waste streams comprise the vast majority of the total municipal waste stream.

In 1988, paper and paperboard alone accounted for 41 percent of the U.S. municipal waste stream, followed by metals at 8.7 percent, glass at 8.2 percent, and plastics (all varieties) at 6.5 percent. Additionally, yard wastes accounted for 17.9 percent and food wastes 7.9 percent.

All together, these materials accounted for over 90 percent of the total municipal waste stream.

Materials Discarded into the Municipal Waste Stream in 1986



Source: Franklin Associates, 1988

Like major waste generators, the municipal waste stream may vary significantly from one municipality to the next, depending on geographical location, climate, community size, residential/non-residential mix, the local economy, and other related factors. Caution should be taken in attempting to apply national figures directly to a specific municipality.

However, currently available data for the composition of municipal waste indicates that most municipalities have the potential to divert substantial amounts of waste from disposal through recycling and composting.

Given a comprehensive recycling and composting program, a 50 percent waste diversion goal by the year 2000 is conceivably within the reach of many municipalities. By adding waste (source) reduction programs, municipalities could increase that potential

7

significantly. However, this level of involvement goes beyond what is currently undertaken by most municipalities.

In designing a local recycling program, a municipality must first analyze the composition of its waste stream.

Depending on local conditions, this process may require a significant investment of time and money. If such an undertaking is beyond the capabilities of a municipality, data from waste composition studies prepared by similar communities or visual surveys on the composition of loads delivered to local landfills may help in gauging municipal recycling potential. Many municipal recycling programs have relied on these inexpensive methods for determining their own waste composition and identifying key recyclable materials.

Dry Recyclable Materials

Because dry recyclable materials are the central focus of most municipal recycling programs they are highlighted here in detail. Typically, dry recyclables are collected through drop-off depots, at the curbside in residential collection programs or through multi-family residential or commercial sector recycling programs.

Most are generated to some degree by all major waste generators, although certain sectors generate specific materials in larger quantities than others. Some of these materials (e.g. newspapers or scrap steel) have been recycled for decades; others (e.g., most plastics) are just beginning to enter the recycling picture.

Dry Recyclable Materials

- **Paper**
  Old newspaper,
  mixed paper, boxboard,
  corrugated cardboard,
  high-grade paper
- **Glass**
  Glass containers
- **Metals**
  Aluminum, ferrous
  (steel, tinned and bi-metal cans)
- **Plastics**
  PET, HDPE, mixed plastics

The following summaries focus on major categories of dry recyclables, their end-uses and general- market outlooks.

Paper

Paper represents the largest volume of material present in the municipal waste stream as well as the greatest amount of recyclable material collected by municipal recycling programs. As a source of secondary fibre, waste paper can be used by mills in the production of newsprint, consumer paper products, stationery and office paper, paperboard, packaging, and building materials (i.e. wallboard, insulation and roofing materials). As more recycling programs come on line and as consumer demand increases, more paper mills are expected to increase their capacity to recycle paper.

It is important to distinguish between the many types of waste paper. *Old newspaper* (ONP) accounts for a major portion of the residential waste stream. Other types of waste paper generated in large quantities by residential generators include *mixed paper* (magazines, junk mail, etc.) and *boxboard* (cereal boxes, laundry detergent boxes, etc.). *Old corrugated card board* (OCC) is produced in large quantities by many commercial sector generators, as is *high-grade paper,* including computer printout, ledger paper from offices, and trim cuttings from manufacturers. Premium prices are paid for some waste papers, providing they meet market specifications. However, ONP and mixed paper also represent some of the most volatile markets for recyclable materials, characterized by wide fluctuations in demand and price.

Glass

Every year, large volumes of post-consumer glass are recycled in a well established and historically very stable market. Generally, old glass containers are reprocessed into new containers. However, the number of applications for recycled glass is on the rise, and includes processes for the manufacture of fibreglass, asphalt, brick, and outdoor siding product. The number of brokers and secondary processors of glass is rapidly expanding in North America due to the involvement of the glass manufacturing industry, beverage container deposit programs, local recycling programs, and related factors. At the same time, recycled glass is a relatively low value material that is costly to ship. In addition, end-use market specifications for glass (i.e. colour sorting and removal of potential contaminants) are quite strict.

Metals

Like glass, *ferrous metals* have a long history of recycling that pre-dates most municipal recycling programs. *Steel* is probably recycled in greater quantities than any other recyclable material, primarily in the form of scrap from discarded cars and appliances. Steel and tin can recycling through municipal programs is also on the upswing. Steel can be easily separated from other materials via magnetic separation during processing.

Additionally, a growing number of industries are interested in reclaiming tin and other metals which may be plated, attached or alloyed to ferrous metals. However, buyers tend to impose strict specifications for recyclable steel, including a minimum of organic contamination or rust.

While paper represents the largest recyclable material by volume, *aluminum* represents the most valuable. Because aluminum is so costly to produce from primary feedstock, recycled aluminum is in high demand in secondary-use markets. In the manufacture of beverage containers, recycled aluminium saves 95 percent of the energy normally required for primary production. Although it accounts for a very small portion of the overall waste stream, aluminum in the form of beverage containers is among the most easily identifiable and collected materials. While beverage containers are under separate deposit systems in many provinces, they continue to be collected through local recycling programs.

In addition to beverage containers, other forms of scrap aluminum (auto parts, eaves troughs, etc.) are also potentially recyclable and have traditionally been collected by scrap dealers and brokers.

Plastics

Although plastics encompass a relatively small portion of the municipal waste stream, they also represent one of the fastest growing segments. As the generation of post-consumer plastics continues to expand, plastics recycling is expected to grow. However, this implies significant progress in the development of a plastics recycling infrastructure, which is still in the early stages.

Currently, plastics recycling is largely focused on beverage containers made of two materials: *polyethylene terephthalate* (PET) and *high-density polyethylene* (HDPE). PET, widely used in the bottling of soft drinks, can be recycled for use in the manufacture of plastic fibre-fill for clothing and other insulated products, non-food containers, injection moulded products, structural foam moulding, and chemicals. HDPE, used in some provinces for fresh juice containers and milk jugs, can be recycled for use in the manufacture of a variety of products including outdoor recreation equipment, fencing pipe, sheet plastic, crates and pallets. *Low-density polyethylene* (LDPE) recycling in the form of plastic bags is also common in some parts of the country. LDPE can be recycled back into plastic bags, plastic lumber and other products.

In addition to the above materials, *mixed plastics,* representing any number of plastic resins in the form of yogurt containers, margarine tubs, plastic containers and films, etc., can be also recycled into simple objects such as park benches, trash containers and car stops. Markets for these products, however, are still relatively new and undeveloped.

In the future, an expanded market for recycled plastics and new processing technologies may promote increased recycling of specific plastic resins including *polystyrene* (PS), *polyvinyl chloride* (PVC), and *polypropylene* (PP).

Special Recyclable Wastes

Some easily identifiable special wastes generated in significant quantities, especially by the residential sectors, are also candidates for inclusion in municipal recycling programs. Some of these wastes, including *lead-acid batteries, household batteries, used motor oil and automobile tires,* may be collected through a number of venues, including curbside collection, drop-off centres, or hazardous waste collection programs.

Many municipalities have established special hazardous waste collection days, while others have permanent municipally operated depots for the collection of such materials. Several provinces are also currently investigating options for widespread collection of special wastes. Additionally, some retailers are beginning to investigate the use of "return-to-retailer" programs for certain products considered to be special or hazardous wastes.

Beyond potential market value, the primary reason for recycling such materials is to divert them from incineration or conventional landfilling where they present significant disposal problems or post environmental hazards. A typical lead-acid battery, for example, contains 8 kilograms of lead and about 4.5 litres of sulphuric acid. Household batteries contain several heavy metals. Improperly disposed motor oil is a major polluter of water ways, especially in rural areas.

Successful recycling of such materials is highly dependent upon available processing capabilities and the accessibility of special end-use markets. Unfortunately, these materials have sometimes been exported overseas for disposal or recycling in countries where the lack of environmental regulation may result in serious environmental contamination. In other cases, they have been stockpiled where they pose other potential environmental risks.

The most desirable option is to safely regulate special waste recycling programs. In some cases, however, there may be no alternative to disposal.

Recycling Program Options

Upon analyzing the number of waste generators, recyclable waste streams and recyclable materials, a municipality has many options to choose from and decisions to make. Selecting the appropriate options and making informed decisions while addressing local conditions and municipal resources is not a simple task.

The following section summarizes recycling program options and outlines key decisions for several areas of recycling program design, including *markets, processing, collection,* and *promotion and education.* In addition, options and key decisions are discussed in another area of activity closely related to recycling program design - *composting.*

Before examining recycling program options, it is important to consider a few basic recycling "truths" that apply to the design of any municipal recycling program. While reconciling them with one another may not always be simple, ignoring any one is guaranteed to create difficulties for a municipal recycling program:

1 ***Recycling programs are market-driven.*** Recyclable materials are not truly "recycled" until they have been delivered to end-use markets and utilized for new purposes. Recycling programs must work within the context of available markets for targeted materials, or locate and develop new markets. Failure to identify potential markets could be a serious mistake. To emphasize this point, the following section on program options first considers available markets, then proceeds "in reverse" to discuss processing and collection options.

2 ***Recycling program design involves an entire system.***
While the question of markets is an appropriate starting point in program design, municipalities will soon discover that all major program elements are interconnected. For example, the number and type of containers used in a curbside recycling program influences the design of the vehicle that collects materials set out, which in turn influences the design of the processing operation accepting these materials - and vice versa. A program's overall design must be flexible enough to accommodate "fine-tuning" as specific program elements are developed and the actual program is implemented.

3 *Recycling programs must balance markets, revenues and waste diversion.*

Diverting more waste from near-capacity landfills and addressing new provincial waste diversion goals have become major forces driving municipal involvement in recycling.

While markets may determine which materials are ultimately recycled, and revenues from the sale of materials are seen as a potential program benefit, it is waste diversion that is considered the final measure of a recycling program's success.

Municipalities must balance their market- and revenue-driven objectives with the overriding goal of maximizing waste diversion.

Markets

As the key element in any recycling program, markets dictate the specific types, quantities and quality of recyclable materials that can be sold. This has a fundamental influence on a municipal recycling program's design and operation.

Without relatively secure markets for the materials it collects, a recycling program could quickly resort to stockpiling materials or disposing of them by conventional means - despite the additional investment made in collecting them.

Therefore, it is strongly recommended that new municipal recycling collection programs begin by closely examining the question of markets.

Key Decisions: Markets for Recyclable Materials

- **Conduct market assessment for targeted recyclable materials**
- **Develop list of potential brokers or users for materials**
- **Negotiate contracts or other sales agreements with purchasers**
- **Form joint marketing arrangements with other recycling programs**
- **Develop municipal procurement programs to stimulate markets**
- **Promote private sector development of procurement programs**

Identifying Materials Markets

It is critical to first identify which recyclable materials are in demand within a given area, who purchases them, and what specifications must be met in order to sell these materials. This process is called a *market assessment*. Ideally, a recycling program's major materials markets will be locally- or regionally-based, minimizing transportation costs and putting the program in a competitive selling position. Realistically, some markets may be national or even international in scale.

There are two basic types of buyers for secondary materials: end-users and brokers. *End-users* are facilities or operations that actually re-use or reprocess secondary materials for use in the manufacture of new products (e.g. a glass manufacturer who uses postconsumer container glass in its furnaces or a paper mill that accepts newsprint or scrap paper). *Brokers* (or dealers) are intermediaries who purchase materials and sell them to end-users. Typically, brokers are able to stockpile large volumes of materials in order to provide the quantities sought by endusers and take advantage of market fluctuations.

There are established buyers for most of the recyclable materials collected by municipal recycling programs. However, buyers may not always be located within a given area. Municipalities may deal directly with either end-users or brokers. In reality, the type of buyer will often be a function of an industry operating locally or regionally. If an end-user of a particular material is located in the vicinity, there may be no need to work through a broker.

Selling to Materials Markets

Regardless of the type of buyer, recyclable materials may be sold on the *open market* or through a *contract sales agreement*. On an open (or "spot") market, a buyer is sought for a specific material when the seller has sufficient quantities or when the market is favourable. This type of arrangement usually involves greater financial risk on the part of the seller - especially when markets are down.

Under a contract sales agreement, the purchase of a specific quantity and quality of material at an agreed price over a fixed period of time is negotiated. Although contracts may vary in the obligations assigned to the seller or buyer, they generally offer the seller greater, albeit not complete, protection from market fluctuations while guaranteeing a long-term outlet for materials. Municipalities involved in recycling often prefer contracts because ensuring a stable outlet is a higher priority than maximizing financial return on sales.

When smaller municipalities are not large enough to generate sufficient volumes of materials to secure markets by themselves, *co-operative marketing arrangements* offer an added advantage. Generally, this involves pooling materials with other municipalities (e.g., through a regional authority) to guarantee the volume of materials required to attract long-term market outlets. Economies of scale in materials processing, collection design and other aspects of program operations, that may be difficult for individual reycling programs, can also be achieved through such co-operative efforts. *The Bluewater Recycling program in Grand Bend, Ontario demonstrates an excellent example of co-operative recycling (see end of this chapter - p.98).*

Market Development

A more favourable environment for municipal recycling programs can be created by developing new markets for recyclable materials.

Market development is the subject of government attention and the focus of a number of provincial studies and initiatives. It is an appropriate role of government to take a lead in such efforts, supported by the large scale involvement and investment of the private sector. Without question, the larger the scale of a market development program, the more widespread its impact on the recycling economy is likely to be. While municipalities may not be the major players in market development, there are ways in which they can assist in developing markets for materials they collect.

Local markets may be developed by the mere existence of recycling collection programs. New municipal recycling programs can provide guaranteed material inputs for local or regional enterprises that purchase, process or remanufacture recycled materials. When municipalities work co-operatively through a regional or province-wide strategy it is possible to multiply their effectiveness in promoting the development of new markets. *A cooperative recycling program in Grand Bend, Ontario has had impressive results (see end of this chapter - p.98).*

At the local level, dry recyclable materials collection offers unique opportunities for "niche" market development, particularly when the right materials and entrepreneurial elements are brought together. In some rural communities, for example, the availability of inexpensive old newspaper has helped stimulate the development of an alternative market for animal bedding. New enterprises for recycled plastics have also been stimulated as a result of collection of post-consumer plastics. While it is still prudent for any municipality to identify secure markets for targeted materials before establishing recycling collection programs, it is also likely that potential markets for some materials may not be realized until the program has begun.

Municipalities can also promote market development by purchasing products manufactured from recycled or recyclable materials. A *municipal procurement program* for recycled content or recyclable products helps reinforce a municipality's investment in recycling collection or processing. Additionally, some procurement efforts, such as requiring public works departments to use municipally produced compost in landscaping operations, represent excellent opportunities to "close the resource loop" by creating local markets for locally generated materials.

Once municipal procurement programs have been established and documented, they can be promoted as model procurement programs for adoption by other local businesses and community institutions. A tried and tested municipal procurement program will help convince other groups that they can incorporate "recycling-friendly" behaviour into their internal procedures and practices. Local business associations and public institutions can be enlisted to promote such programs. If an entire community or region revises its procurement practices to favour the purchase of recycled or recyclable products, the potential impact on local market development could be significant.

Overall Market Trends

Historically, natural resources and raw materials in Canada have been plentiful and inexpensive, and public policy has reinforced their consumption. Today, despite the growing emphasis on conservation and sustainable development, the nation's economy - from manufacturers to consumers - continues to be biased towards the use of virgin materials.

In order to compete in this system, recyclable materials must be available in significant quantities, comply with strict end-user specifications, and be highly competitive in terms of pricing.

While there is an emerging national and even international economy for recyclable materials, a number of factors continue to challenge the establishment of long-term, stable markets.

Market prices for materials may fluctuate significantly, driven by a number of short-term factors including changes in supplies of virgin stocks, energy and transportation costs, government programs, labour-related issues, economic downturns, markets temporarily flooded with inexpensive materials (e.g. a glut of old newspaper in certain market areas) due to the success of established recycling programs.

Despite these variables, viable markets for most of the recyclable materials collected by municipal recycling programs exist in many areas of the country and, when transportation costs are not a major factor, in the United States or overseas.

Municipalities that have convenient access to rail or port facilities may have an added advantage in selling their recyclables to these distant markets.

If a long-term trend toward an economy tuned to Sustainable Development and conservation of natural resources takes hold, and new recycling options continue to be developed, it is likely that end-use markets for most recyclable materials will continue to expand.

However, uncertainty and volatility in many materials markets and regions will probably continue to be a fact of life for local recycling programs during the coming decade.

Processing

Materials processing includes all those steps between the collection of recyclables and their shipment to market that are necessary to meet buyer specifications. Processing provides the added value capable of transforming materials from waste to truly recyclable materials ready for a variety of end uses. It also has an impact on the way materials are initially source separated and collected. Without comprehensive processing, brokers' or end-users' specifications could not be met, and materials would be unable to meet the requirements of contract sales agreements, and could not compete on the open market.

Key Decisions: Processing

- **Identify target recyclable materials and their market specifications**
- **Estimate volume of recyclable waste stream requiring processing**
- **Determine processing materials flow, equipment needs and projected costs**
- **Determine overall scale of municipal processing operation**
- **Determine degree of municipal involvement in processing operation**
- **Design processing facility and materials flow**
- **Promote interjurisdictional co-operation to meet joint processing requirements**

Processing Procedures and Equipment

Processing of recyclables normally covers a number of basic steps, including: *unloading of collection vehicles, sorting, densification, storage, loading for shipment*, and *shipment to market*.

Key Steps in Materials Processing Operations

- **Unloading:**
  Collection vehicles unload recyclable materials at materials processing facility
- **Sorting:**
  Contaminants are removed from materials; materials are further separated to meet quality specifications
- **Densification:**
  Materials are densified and prepared for shipment
- **Loading:**
  Materials are loaded in containers and stored for shipment
- **Shipment:**
  Materials are shipped to market

Each step of the process has specific requirements in terms of plant, equipment and labour that reflect the overall scale of the operation, the specific materials processed, and their end-use specifications. Most of the actual processing usually takes place during sorting and densification stages.

In *materials sorting*, for example, recyclable materials are segregated into separate material streams and contaminants are removed. If necessary, further grade-sorting takes place during this stage (e.g. separating coloured container glass into clear, amber, and green). Equipment typically used during sorting includes ***air classifiers*** to isolate lighter materials from heavier materials, and ***magnetics separators*** to separate ferrous from non-ferrous metals.

During the ***densification stage***, individual materials are condensed for shipment to market. Equipment typically used during densification includes ***balers*** to bale such materials as ONP, cardboard and plastics, ***densifiers*** to form aluminum and steel cans into dense cubes, and ***crushers*** to process colour-sorted glass into ground glass or cullet.

Other equipment for moving and handling materials commonly used in processing operations include ***skid steer loaders, front-end loaders, ramps, conveyors, gaylords, trailers, forklifts, blowers, roll-off containers,*** and ***weigh scales.***

There are a number of factors critical to the success of materials processing operations.

Economies of scale are essential to guarantee the volumes of materials necessary to meet market demand at a competitive price.

Operational efficiencies are necessary to minimize the number of materials handling requirements and maximize equipment utilization, thus controlling processing costs.

In addition, sufficient processing ***capacity*** to meet potential storage and expansion requirements and ***flexibility*** to accommodate new materials and processing technologies are also critical to a processing facility's long-term success.

Addressing all these factors is not a simple task, especially when considering the costs that may be involved. A full-fledged processing operation may entail significant capital investments and operational expenses. However, due to such factors as unstable materials markets or high transportation costs, sales of processed recyclable materials cannot always be expected to cover these costs.

Scale of Processing Operations

There are a number of factors that influence the scale of a materials processing operation. The greater the number of materials collected or degree of commingling at the point of collection, the more complex the processing requirements. At the same time, the more demanding the end-use market specifications, the more stringent the processing standards. When both these factors come into play, a full-fledged materials processing operation may be necessary.

Depending on the costs, *centralized materials recovery facilities* (MRFs) can be designed to accommodate practically any level of processing requirements. In some situations, however, operations providing intermediate or even minimal processing may be all that are required.

The single most important factor influencing the scale of processing required by a municipality is *collection program size*. If a recycling program serves a large population and collects significant quantities of materials, the municipality will likely need to be involved in a full-fledged materials processing operation. This might occur by directly participating in ownership and/or operation of a MRF, or by contracting a private firm for processing services.

On the other hand, smaller recycling programs with lower volumes may find it more appropriate to provide minimal materials processing or simply storage and transfer of materials, while relying on co-operative efforts with other municipalities or jurisdictions or the private sector for the provision of more centralized processing services.

Collection

Collection encompasses all those steps required to move recyclable materials from the source of generation to a transfer facility or processing operation. It is through source separation and collection of recyclables that materials are actually diverted from disposal. Because collection is the most visible element of a municipal recycling program, it is often seen as synonymous with the entire recycling process. In reality, collection is only the first stage.

Key Decisions: Major Collection Options

- **Select collection program options that match local waste sectors, recyclable waste streams, targeted reyclable material**
- **Select collection program options that match identified materials markets and required processing operations**
- **Prioritize major collection programs for implementation**
- **Phase implementation of targeted collection programs**

Given the number of waste generators and recyclable waste streams, a municipal recycling program has numerous collection options from which to choose.

Major Recycling Collection Options

- **Drop-off/buy-back collection:**
  Participants source separate their recyclables and bring them to a specified drop-off or buy-back facility
- **Curbside collection:**
  Participants source separate their recyclables and set them out in container(s) for curbside collection
- **Multli-family collection:**
  Participants source separate their recyclables and bring them to a centralized storage area for collection
- **Commercial collection:**
  Participants source separate their recyclables and bring them to a centralised storage area for collection

A municipal recycling collection program can be as simple as a single drop-off recycling depot or as ambitious as a comprehensive collection program providing pick-up of recyclable and compostable materials from homes, apartments and businesses. Most municipal recycling programs fall somewhere in between.

Generally, the smaller the community, the less complex the recycling program required. However, given ambitious new waste diversion goals, the long-term trend may be one of growing municipal involvement in all forms of recycling collection.

Major Recycling Collection Options

Recycling collection options can be categorized into four basic types of operations: *drop-off/buy-back, curbside, multi-family,* and *commercial collection.*

Drop-off collection requires participants to source separate recyclable materials and bring them to designated drop-off collection sites. Drop-off facilities range from simple, self-service materials collection containers to large, fully-staffed, multi-material collection depots. Such facilities are normally located in areas accessible to the public, such as commerial areas, shopping centres, schools or other public buildings.

Drop-off collection programs are well suited to small and/or rural communities, where lower population densities, smaller volumes of recyclables, or higher numbers of self-hauling waste generators may not justify more complex or expensive collection systems.

Drop-off facilities are also useful as low-cost alternatives, back-up options, or transitional waste diversion strategies for residential or commercial collection programs in larger communities.

Because users of drop-off facilities are responsible for both source separation *and* delivery of materials to the designated collection site, participation in such programs is often relatively low. As a result, communities relying exclusively on drop-off facilities may experience some difficulty in achieving their potential for maximum waste diversion.

However, in some small towns or isolated rural communities, drop-off centres may be the only real alternative for recycling collection. *A volunteer drop-off program in rural Nova Scotia has worked remarkably well (see end of this chapter - p.102).*

At the same time, drop-off participation can be significantly increased when facilities are located near landfill sites or transfer stations. Adjunct drop-off facilities often boast high materials recovery rates - especially when they are operated in combination with waste exchanges or materials re-use centres. Additionally, effective promotion and education programs and the involvement of community nonprofit groups can help further boost participation in drop-off collection programs.

Buy-back collection refers to drop-off centres that offer various financial incentives, such as cash paid for materials, as a way to encourage public participation. Beverage container depots are a common example of buy-back operations.

In the province of Alberta, for example, beverage container depots are based on a variable deposit fee placed on different types and sizes of beverage containers, while in Manitoba depots work in a non-deposit setting (see end of this chapter - pp.100 & 102).

Buy-back operations may also be operated on a localized scale and accept numerous types of recyclable materials.

Curbside collection requires participants to source separate their recyclables and place them at the curbside (or in an alley) for pick-up by a designated collection vehicle. In addition to single family households, curbside recycling programs sometimes serve smaller low-rise multi-family units or small commercial accounts where this type of collection is feasible: for example, urban storefronts, restaurants and bars.

Since curbside programs are so convenient, they often have a higher level of participation and recovery than drop-off programs. While such programs are more complex to set up and costly to operate, the cost-per-tonne to divert material may compare favourably with fully costed alternative waste management options.

Curbside recycling is normally best suited to larger cities, suburban communities, or small towns involved in co-operative programs for collection and processing of recyclable materials. Although the curbside option is perhaps the most widely recognized form of recycling collection, it can vary significantly from one municipality to the next. Municipalities setting up curbside collection have a number of important choices to make which are described in more detail later in this chapter.

Multi-family collection requires residents of apartment buildings, high-rises, and other large multi-unit residential structures not suited to curbside collection to source separate their recyclables and place them in special containers for centralized storage and pick-up. Centralized pick-up sometimes requires collection systems quite different from those used in curbside recycling. In addition, the wide variety of building types may necessitate different collection approaches within the same program. Since multi-family garbage is often collected with commercial waste, recycling programs for these units frequently require the involvement of private haulers and recyclers.

Implementing a municipal multi-family recycling collection program typically involves conducting an assessment of the local multi-family housing stock, including number of units, locations, structure types, and existing garbage collection practices. In addition, individual residential structures must be assessed in order to design proper collection and storage systems. Such assessments normally cover physical restraints to collection, type of collection containers, intermediate storage areas, resident participation, and building manager involvement. Actual collection system design involves addressing such issues as number and type of collection vehicles, number of stops per vehicle, and sorting and rooting procedures.

Commercial collection generally requires waste generators to place recyclable materials in special containers for centralized storage and pick-up by a commercial waste hauler or recycling company. As noted earlier, smaller businesses and commercial facilities can sometimes be integrated into curbside collection programs. For the most part, however, commercial recycling differs from drop-off, curbside and even multi-family collection in a number of ways, including the nature of commercial waste generators, their waste streams, types of materials collected, and collection systems required.

The significant diversity of the commercial/institutional and industrial waste stream means that commerial collection can change significantly from one facility to the next. This makes collection of recyclables more complex and challenging for haulers.

Setting up a recycling collection program for an individual, industrial, commercial or institutional facility involves a number of discrete activities. These usually include:

1. Conducting an audit of the waste stream,
2. Identifying markets for targeted recyclable materials,
3. Determining specific storage, container and equipment needs,
4. Contacting a hauler or municipal collection program,
5. Promoting employee involvement and training participants, and
6. Monitoring materials recovery rates, revenues and costs once collection has begun.

Obviously, promoting commercial recycling on a community-wide basis is a far more ambitious task. At the same time, the potential to increase overall municipal waste diversion is also quite high.

Although some commercial sector materials such as corrugated cardboard and office paper have been recycled for years, comprehensive commercial recycling has been slower to develop than curbside or multi-family recycling collection programs.

Most municipalities have only begun activities in commercial recycling. In part, this is due to the lack of direct municipal involvement in commercial waste hauling.

However, in order to achieve ambitious new waste diversion goals, many municipalities are realizing that they must take a stronger role in promoting commercial recycling - if not through direct participation in collection, then by other means.

The Region of Peel in Ontario has embraced an impressive commercial waste diversion program (see end of this chapter - p.104).

In addition to collection, municipal involvement in commercial recycling may include such diverse activities as:

1 Information and technical assistance programs for businesses and institutions (e.g. providing waste audits, and how-to literature);

2 Programs for the development of commercial recycling infra-structures (e.g. assistance to commercial haulers, market development, materials exchange programs);

3 General promotional and educational activities (e.g., commercial recycling hotlines, business awards programs); and

4 Adoption of municipal ordinances and standards to provide increased incentives for commercial recycling (e.g. disposal bans, differential disposal rates).

Residential Curbside Recycling Collection

It should come as no surprise that curbside recycling has been the most rapidly expanding form of municipal recycling in recent years, particularly in the nation's urban areas.

Across Canada, the growing interest in curbside programs results from a number of trends focusing public attention on the nation's solid waste problems and actions that individuals can undertake in their own homes. At the same time, curbside has provided many municipalities with effective, often politically popular, strategies for promoting increased waste diversion. *The City of Edmonton, for example, boasts* *a particularly successful curbside collection program (see end of this chapter - p.106).*

As a result of its popularity, curbside recycling has been established, or is in the planning stages, in most major Canadian urban centres.

For municipalities that have yet to become involved in recycling and which demonstrate appropriate local conditions (i.e. available markets, suitable population densities and sufficient volumes of materials), curbside recycling offers a logical first step in the development of a comprehensive waste diversion program.

Key Decisions: Curbside Recycling Collection Programs

- **Identify number and type of materials to be collected**
- **Determine level of materials separation required of residents**
- **Select number and type of collection containers to be used**
- **Determine level of sorting required of crews during collection**
- **Select preferred design and manufacture of collection vehicles**
- **Design most efficient collection routes**
- **Determine frequency and timing of collection service**
- **Consider additional participation requirements (e.g. mandatory source separation)**

While setting up a curbside recycling collection system may be less challenging than multi-family or commercial recycling, there are a number of important design and implementation decisions that make it more complex than normal garbage collection design.

Major variables which must be considered include: *number and type of materials collected, level of source separation, number and type of containers, level of curbside sorting, type of collection vehicle,* and *design of collection routes*. Addressing these variables will determine the overall design of the curbside collection system.

Determining the ***number and type of materials*** involves selecting which recyclable materials will be set out for pick up. An understanding of the composition of the local residential waste stream, as well as major collection and processing considerations, is necessary in making this decision. Initially, not all materials immediately available in the waste stream may be selected for collection. Collection of some may be deferred due to low volumes, unavailable markets, or lack of buyers. Yet, new materials may be added for collection if these conditions change as the program grows and develops.

Once materials have been selected, the ***level of source separation*** required of residents must be determined. After segregating recyclables from the rest of their household waste and preparing them for collection, residents may be required to sort them into several distinct material streams. Materials may be fully source separated (i.e. three or more distinct waste streams), partially commingled (e.g. combining glass, metal and plastic containers) or, in some cases, fully commingled (e.g. all materials in one large container). Specific source separation requirements will reflect the type of materials collected, as well as collection and processing considerations.

Source separation requirements combined with the chosen collection methodology will dictate the ***number and type of containers*** required. Generally, most curbside recycling programs use one to three containers per household, whether the materials are source separated, partially commingled, or fully commingled. *Notre-Dame-des-Prairies in Québec is currently testing a new 'Blue Bag' approach to collecting commingled recyclables (see end of this chapter - p.108.* Other container types may vary from single buckets or bins (e.g.. Canada's ubiquitous "Blue Box") to three-way stackable bins or even large roll-out containers. Standardizing the size and type of containers used, and providing them to program participants, benefits municipal recycling programs in terms of increased participation levels, greater collection efficiencies, and improved program visibility. These containers may be paid for by the municipality or by residents themselves. Cardboard boxes, recycled plastic food pails, or paper, cloth and plastic bags may be used in lieu of "formal" collection containers - or to augment such containers when additional capacity is required.

Depending on the level of source separation required of participants, the number of containers and type of processing, some level of additional ***curbside sorting*** by vehicle crews at the point of collection may also be required.

All these factors, in turn, will affect the ***type of collection vehicles*** used. Vehicles may vary widely, from traditional step vans, flat beds, trailers and even garbage packer trucks, to newer, custom-designed vehicles including open body and closed body recycling trucks, low profile closed body trucks, and hydraulic side loading trucks. There are distinct advantages and disadvantages to all of these vehicle types. Generally, traditional vehicle designs tend to be less adept at curbside recycling collection, often requiring some level of retrofitting. Newer vehicles designed expressly for curbside collection of recyclables are usually more efficient, although they may also require significant capital investments.

Ultimately, curbside collection culminates in the actual ***design of collection routes***. Essentially, the design of each collection route is based on the projected number of "pass-bys" or residential accounts that can be served by a single vehicle. This design, in turn, reflects several factors, including street layout, housing densities, truck design, number of collection crew per vehicle, actual collection hours, travel time to and from the route, number of collection sorts, set-out rate on a given collection day, and volume of materials set out per household.

Other important curbside program design variables include ***frequency of collection*** (i.e. weekly, bi-weekly, monthly collection service), ***timing of collection*** (i.e. collection provided on the same or alternative day as garbage collection), and ***participation requirements*** (i.e. whether participation is voluntary or mandatory). Studies have shown that more frequent collection, same-day-as-garbage service, and mandatory participation all tend to increase the level of participation. However, each of these decisions may have specific implications and costs for a curbside collection program.

Curbside Recycling Collection Design Criteria

- **Resident Convenience**
- **Collection Efficiency**
- **Cost Effectiveness**
- **Materials Integrity**

There are four basic criteria that can help determine how a municipality works with these variables: *resident convenience, collection crew efficiency, cost effectiveness*, and *materials integrity*.

Generally, program variables that promote increased convenience, cost effectiveness and materials integrity will help ensure the success of a curbside collection program.

Resident convenience is a function of how simple it is to source separate, store and set out recyclables. The more convenient the collection system is for residents, the greater their participation. This can significantly boost a program's overall materials recovery rates. Ideally, recycling collection should be as convenient for participants as their regular garbage collection service.

Collection efficiency is largely a function of loading and sorting onto a vehicle at the point of collection. The simpler it is for collection crews to sort and load materials, the less time is required to service each household. This can boost a program's overall level of efficiency.

Cost effectiveness is critical. Inefficient or inappropriate collection systems can become a financial burden on a municipality. As such, the equipment procured and procedures must maximize collection crew and vehicle productivity.

Materials integrity, or minimizing materials contamination, will ensure that the highest possible price can be secured in the marketplace. There are basically three lines of defence in ensuring materials integrity: sorting of materials in the household, vehicle crew sorting and collection, and the actual processing of materials. By the time materials have passed through these three filters, contamination should be minimal.

Promotion and Education

Promotion and education are essential components in implementing municipal recycling programs. Without such activities, even the best collection, processing and marketing systems cannot guarantee a program's success.

Key Decisions:
Recycling Promotion/Education (P/E)

- **Determine basic P/E roles that match local recycling programs**
- **Select appropriate communication techniques**
- **Match techniques to local conditions and available resources**
- **Develop a phased implementation strategy**
- **Build on existing municipal informational programs and services**
- **Develop an overall recycling program theme**

A well-designed promotion/education (P/E) strategy can be instrumental in achieving and sustaining a high level of participation, which translates into greater materials recovery levels, increased program cost effectiveness and, therefore, overall program success.

Basic Roles of Promotion/Education

- **Communicating general information**
- **Encouraging public participation**
- **Providing program-specific information**
- **Instructing participants in recycling procedures**
- **Responding to requests for information**
- **Promoting long-term behavioural change**

The most extensive P/E programs are those focussing on residential recycling. Thus, the following examples are based largely on the residential recycling P/E models. While most of the basic roles identified can be translated for commercial recycling programs, the different waste generators, waste streams and collection systems involved in commercial recycling may require substantially different strategies and techniques.

Basic Promotion/Education Roles

A comprehensive P/E strategy may perform up to six basic roles: *communicating general information, motivating participation, providing program specific* *information, instructing participants in recycling procedures, responding to requests for information*, and *promoting long-term behavioural change*. While these roles share the common objective of sustained public involvement in recycling, they involve very different kinds of messages, communication techniques, and specific end results.

Communicating general recycling information creates a foundation for municipal recycling programs by raising general public awareness of solid waste issues and potential solutions. Such an approach will help make a local audience more receptive to specific recycling information.

Encouraging public participation involves providing a motivational message that actually moves potential participants to become involved. Such a message may vary from - "you can help protect our environment" to "you can save on garbage disposal costs" - depending on the program and nature of the local community.

Once motivated, participants need to know what is involved in recycling program participation.

Providing program-specific information gives participants the basic facts they need to participate - the Who, What, Where, and When information. (*Who* will participate? *What* will they actually be asked to do? *Where* and *when* will they be required to do it?) Most participants will also require actual instructions in whatever actions are necessary to prepare their materials for collection - the "How-to" information. (How do they source separate their materials, set them out at the curb or deliver them for drop-off?)

Instructing participants in recycling procedures may involve the distribution of information or even face-to-face recycling demonstrations.

Responding to requests for information will help handle all the specific questions and problems that may arise once a program is up and running. For example, many communities find that recycling "hotlines" are essential to integrate new participants into their programs and keep their programs running smoothly.

Promoting long-term behavioural change through educational programs and other special projects will help generate the sustained support necessary to make recycling a permanent part of the community - rather than just a passing fad.

Providing feedback on a program's success in meeting overall waste reduction goals can also be an effective way to sustain public participation.

Promotion/Education Techniques

There are many channels, or media, through which Promotion/Education Techniques may be employed. These range from the use of traditional advertising and public relations approaches to provision of special information products specifically designed to instruct program participants in recycling.

Techniques commonly used by municipal recycling programs include: *local news media* (e.g. press releases, articles for publication, public interest programming), *printed materials* (e.g. brochures, mailers, program newsletters), *advertising* (e.g. ads in local media, transit ads, billboards), *special events* (e.g. press conferences, kick-off ceremonies, municipal proclamations), *community-based campaigns* (e.g. neighbourhood meetings, local canvassing, recycling container distribution programs), and *other information services* (e.g. recycling hotlines, recycling information booths, educational programs).

Some of these techniques may match specific P/E roles. For example, neighbourhood meetings or container distribution programs present ideal opportunities to instruct participants in basic recycling procedure, while recycling curricula for local schools are useful in promoting long-term behavioural change. Some techniques are most effective when used in a particular phase of a program. For example, special events are often used during program start-up.

Most municipalities don't employ all these techniques, but rather combine them to form a targeted, phased P/E strategy. The key is to select information and activities that not only correspond to the local recycling program, but also match local conditions and available resources.

Recycling Program Theme

In developing P/E strategies, many municipalities make use of an overall recycling program theme. A theme can tie a variety of P/E activities together by communicating a common visual identity and basic recycling message. This will enhance overall program visibility and reinforce the effectiveness of individual P/E communication techniques. Most program themes have two elements: a *program logo* and *program slogan*. A logo addresses the need for a common visual identity, while a slogan addresses the need for a basic recycling message. Used together or separately, a logo and slogan can be worked into almost any format, whether it is a basic informational brochure, public service announcement, mobile recycling exhibit, or household recycling container.

The basic guidelines in the development of all P/E materials are *clarity, consistency* and *professionalism*.

Clarity means that the simplest images and messages are the most easily communicated.

Consistency implies the repeated use of the program theme in all communication efforts in order to increase familiarity.

Professionalism, as in all things, calls for the highest possible quality in design and editorial standards. Silly images or cloying messages can actually turn potential participants off, rather than entice them to become involved.

Composting Program Options

Composting is a major waste management option that offers municipalities the potential to divert an entirely different portion of the municipal waste stream - the "wet" or organic portion - from the land fill. Given the significant volume of organics in the waste stream - especially during peak growth seasons - municipal composting can substantially increase the overall amount of waste that is diverted from disposal when it is combined with other recycling and waste reduction programs. Indeed, if municipalities are to achieve high waste diversions levels, composting programs are probably essential.

Composting is a controlled process of natural degradation through which yard waste, food wastes and other degradable organic materials are reduced in volume and converted into a nutrient-rich soil additive (or humus) with a variety of applications in gardening and landscaping. In some circumstances, this product may have considerable commercial potential.

Key Decisions:
Municipal Composting Programs

- **Determine preliminary end-use markets**
- **Estimate sources, composition and volume of available compostable materials**
- **Select approprlate overall composting options (backyard v. centralized)**
- **Select approprlate composting collection system**
- **Establish evaluation, monitoring and testing procedures**

Like recycling programs for *dry* recyclable materials, municipal composting programs are designed by moving through the same basic set of decisions - identifying available or potential markets, determining necessary processing requirements, and developing appropriate collection systems - although the order of these steps may be different.

These decisions, in turn, are influenced by the overall scale of composting operation that is possible given available waste volumes and other local conditions.

Basic Composting Approaches

Three very different approaches are technically available to most municipalities in developing municipal composting programs: *backyard composting*, *centralized composting*, and *municipal solid waste (MSW) composting*. Backyard composting and centralized composting offer the most immediately feasible and affordable alternatives for most Canadian municipalities. These options are described more fully below.

In MSW composting, manual and mechanical preprocessing is used to isolate the compostable portion of the municipal waste stream (i.e. yard wastes, food and organic wastes, and such organic fractions as paper) in order to prepare it for large scale composting. Such separation can be part of a "full stream" processing system which simultaneously serves a number of waste management options, including composting, recycling, and preparing "refuse-derived" fuels. Actual composting involves a relatively high level of technology involving in-vessel systems or digesters. Still considered a developing waste management option in North America, MSW composting is beginning to attract widespread interest. At the same time it has yet to fully prove itself, especially in terms of the quality (i.e. level of contamination) and marketability of the final compost product.

While other large-scale composting systems are becoming more available (e.g. composting of agricultural and animal wastes, wastewater treatment sludge, or "co-composting" of municipal solid waste with sewage sludge), they are also more technically demanding than centralized composting and relatively new to the North American scene.

Backyard composting involves the construction of compost piles by individual residents on their property where organic yard and household wastes may be diverted. Because collection of these materials can be reduced or even eliminated in its entirety at the source of generation, backyard composting can technically be considered a form of waste (source) reduction.

While residents can build their own backyard composting systems, numerous prefabricated or easily-assembled composting devices designed for home use are also commercially available in a rapidly expanding market. The most common role played by municipalities in establishing backyard composting is to provide residents with information and technical assistance. Subsidizing the purchase and distribution of composting devices is another potential option for municipalities seeking to promote backyard composting.

Depending on specific local conditions including climate and available vegetation, backyard composting can be established in almost any type of municipality. Not a great deal of space or material is required. Preliminary studies on backyard composting reveal that it has the potential to be a highly cost-effective waste diversion option. ***One such study in Newcastle, Ontario has shown impressive results (see end of this chapter - p.110).***

Like recycling itself, backyard composting also offers citizens the opportunity to take the waste stream into their own hands, so to speak, and to become more responsible for their own actions as generators of waste. It is an option with distinct appeal for many Canadians.

Centralized composting is a more appropriate - albeit ambitious - waste management option for municipalities with significant organic waste streams, major markets for commercial-grade compost, and an established waste collection infrastructure. In this system, such materials as leaves, grass clippings, other organic yard and garden waste, food waste, or a combination of the above, are collected from residences by the municipality or its agent, and delivered to a centralized facility for use as a feedstock for a large-scale composting facility. (Brush, stumps and wood waste may also be included in centralized composting but only if they have been mechanically chipped.)

In a centralized composting process, organic materials are typically placed in *windrows* or elongated piles where decomposition begins at a rate dependent on the levels of oxygen and moisture, and the presence of nutrients. Actual decomposition is caused by micro-organisms which feed on the available nutrients. The metabolic activity of these organisms alters the chemical composition of the material, generating heat, releasing moisture and reducing overall material volume. As the supply of nutrients begins to decline, the generation of heat slows and the material cools. Ultimately, a dark, rich humus results. While certain forms of human or mechanical intervention may alter the speed or intensity of the composting process, it is essentially a natural one.

Centralized composting may involve varying levels of technical complexity - from *minimal and low technology composting systems* which have relatively low capital and operating costs, to *intermediate and* *high technology systems* which have relatively high capital and operating costs. In typical lower-tech operations, little more than forming and turning windrows takes place. Higher tech operations may use machines to turn windrows, and vessels or other mechanical systems to contain and control the composting process.

Generally, minimal and low-tech systems require more time for the organic degradation process to occur (18 months to three years). They may also have larger space requirements to allow proper aeration of organic materials and buffering from surrounding land uses. Higher tech systems, on the other hand, generally require less time (6 months or less), while space requirements vary depending on the exact type of technology used. Economies of scale for centralized yard waste composting do not necessarily result by increasing the overall size of the facility.

Centralized composting is a complex technology requiring specialized expertise. Municipalities wishing to implement it would be wise to consider the existing expertise of waste management companies, as well as the amount of compostable material available, distance between collection routes and composting site, markets, overall cost, and local or provincial regulations controlling such operations.

Compost Markets

Markets are as integral to centralized composting programs as they are to programs for dry recyclable materials. Without markets or some form of outlet for the final product, a compost program would have difficulty surviving. Typical end-use markets for compost include agricultural operations, nurseries, greenhouses, and individual homeowners' lawns and gardens. Compost products may also be used internally by municipal public works and parks departments for landscaping and related programs, or by highway departments for roadway and median strip landscaping. Finally, compost may be sold or distributed free of charge to local residential or institutional users; in one sense, they have already paid for the material.

In addition to producing compost in significant volumes to meet market demands, the final product must meet strict product specifications for purity, appearance, porosity, texture, consistency and chemical balance. Not surprisingly, concerns over the quality of compost produced by municipal composting operations tend to be higher than for commercially available soil additives. Thus, assuring a contaminant-free product is critical to the marketability of compost produced by municipalities. This implies a strict monitoring and product testing program on the part of the compost operation.

Program Costs and Benefits

As mentioned in Chapter 1 of this handbook (see "Overview: Municipal Solid Waste and Municipalities in the 1990s) the rising cost of waste collection and disposal services is one of the major forces working to promote increased source reduction, recycling and composting at the local level. As it becomes more expensive to collect and dispose of our waste, incentives for municipalities to create cost-effective alternatives to traditional collection and disposal of solid waste continue to grow.

Such waste management alternatives have the potential to save on the cost of disposal and, with careful planning and implementation, offset program costs with revenues from the sale of recyclable materials or municipally produced compost. However, even with such strong incentives in place and the added prospect of revenues, the costs of implementing such programs can represent a significant investment on the part of a municipality. Program cost is a major factor for any municipality to consider in seeking to increase the amount of waste it diverts from disposal. And, as in all things, there is no such thing as a free lunch.

Source reduction presents a relatively new concept in waste diversion, and it benefits a community primarily through the avoided cost of disposal. Furthermore, there is a challenge in accurately monitoring the impact of specific source reduction measures. These factors make it difficult to assess the cost-effectiveness of municipal source reduction efforts. However, there are indications that source reduction may be a cost-effective option and the measurement of its precise benefits and costs will undoubtedly be the focus of much discussion and analysis over the coming decade.

By contrast, municipal recycling and composting programs have a longer history of implementation at the local level and are easier to quantify through reporting and materials handled. Until fairly recently, the economics of such programs were largely determined by the value of the materials generated and sold. However, as the costs of traditional forms of disposal have escalated, recycling and composting are also increasingly measured in terms of their waste diversion impact and the cost of avoided disposal.

There is no, one, recommended method by which a municipality can determine the cost of a proposed recycling or composting program. However, given the importance of ensuring that any program does not become an economic burden, it is critical that every municipality carefully assess the relative costs and benefits of becoming involved in such waste management options. While it is beyond the scope of this handbook to provide specific formulae or schedules for estimating individual recycling or composting program costs, the following discussion may help in identifying basic factors that should be taken into consideration.

Analyzing Program Benefits and Costs

Benefit-cost analyses can be used to compare the relative economic benefits of a specific municipal recycling or composting program. Simply put, if the benefits of a program are projected to exceed its costs, the program may be deemed to make economic sense for a municipality. Alternative approaches to specific programs can also be assessed for their relative economic advantages.

For example, which makes more sense in a curbside collection program: full source separation of materials with fewer processing requirements or full commingling with greater processing requirements? Benefit-cost analyses can help in determining the least-cost options. In using benefit-cost analyses, it is critical that accurate information be used in assessing such programs.

Key Decisions: *Recycling Program Benefit-Cost Analysis*

Benefit Calculations

- **Estimate annual material recovered**
- **Project annual revenue for recovered materials**
- **Determine annual value of other benefits (savings and grants)**
- **Calculate total annual benefit**

Cost Calculations

- **Determine total capital cost**
- **Determine total start-up cost**
- **Determine annual operation & maintenance cost**

Benefit-Cost Comparison

- **Determine benefit-cost ratio**

Three general categories of benefits can be calculated in a benefit-cost analysis:

1 revenues from materials,
2 savings to existing municipal solid waste management operations, and
3 direct program grants and other subsidies.

Revenues are based on the sales of materials collected or produced. Generally, revenues increase with the size of the program and amount of materials generated. It should be remembered, however, that actual revenues accrued are highly dependent on the identification and availability of end-use markets and favourable market conditions for specific materials.

Savings can be measured in the cost reduction for other elements of a municipal solid waste management system, e.g. landfill disposal, transportation, collection, or facilities operation.

Grants and subsidies that assist with program costs (i.e. government funding or in-kind donations such as land or facilities) can also be considered as benefits.

There are three general categories of costs:

1 Capital costs,
2 Start-up costs, and
3 Operation and maintenance (O&M) costs.

Capital costs include such items as land, buildings, processing equipment, collection vehicles, and recycling containers. Financing of such items can also be considered a form of capital costs. When certain program operations, such as collection or processing, are contracted out, municipal capital expenditures can be greatly minimized.

Start-up costs are one-time program expenses, such as program kick-off campaigns or environmental review costs, that do not involve capital investments.

Operation and maintenance costs focus largely on labour, including salaries and benefits, as well as such operational expenses as vehicle fuel, utilities, insurance, licenses, maintenance, and repairs. Program operations that are provided by contractors are also considered to be O&M costs.

Specific benefits and costs of recycling or composting programs will vary significantly, depending upon the municipality, the design of its program, its current solid waste management system, local conditions, and related factors.

No, two, municipal programs will have exactly the same benefits and costs. For example, if collection and processing of recyclable materials is contracted out to private firms, there may be no revenues from the sale of materials, or no direct savings due to reduced collection costs or tipping fees.

In developing a benefit-cost analysis, it is critical to incorporate specific program features in order to produce an accurate assessment of actual costs and benefits.

Calculating a program's benefits involves a number of specific tasks. For a municipal recycling program, these include:

1. Estimating the amount of material that will be recovered,
2. Projecting annual revenue from the sale of recovered materials, and
3. Determining the annual value of other identified program benefits.

Each of these calculations may involve a series of very specific calculations.

Estimating recovered materials, for example, involves determining the annual amount of waste available, the composition of the waste stream in the collection area, and the expected participation of individual waste generators.

Projecting revenues involves estimating the amount of individual materials collected multiplied by their projected sales price.

Determining the value of other benefits may involve any number of calculations, depending on the municipality and its specific program design. All of these factors are then used to calculate total annual benefits.

Calculating a program's costs is a little less complicated. It basically involves adding individual capital expenditures and annual O&M costs. Capital expenditures covered by grants are not included in this calculation, while O&M costs are adjusted to reflect anticipated annual increases or decreases in costs.

Once total benefits and costs have been determined, they need to be accurately compared against each other. Whatever the method of comparison, it should take into consideration the fact that different costs are incurred at different times during the life of the program.

Major capital investments typically occur before a program is rolled out, start-up costs occur at the point of implementation, and O&M costs are ongoing. Using a "present net value" analysis, for example, the sum of the present net value over the program's life is divided by its initial capital costs. If the result is greater than one, the project can be considered economically justifiable.

When comparing different program approaches, the one with the highest benefit-cost value could be considered the best program - albeit from an economic point of view.

While benefit-cost analyses provide useful economic indicators of a recycling or composting program's likely costs and benefits, municipalities would do well to remember that any other number of qualitative factors, provincial or municipal policy, public opinion, or local political initiatives will ultimately come into consideration in deciding its future involvement in such programs.

Co-operative Small Town Recycling in Ontario

Bluewater Recycling, headquartered in Grand Bend, Ontario, is one of Canada's leading examples of successful small town recycling. Bluewater is a truly cooperative program: thirty-seven municipalities in four counties market secondary materials jointly, share a common multi-material processing facility and co-ordinate collection, promotion and other recycling program activities.

Thirty of the participating municipalities provide curbside recycling service to a total of 30,000 households. The seven remaining communities rely on centralized depots. The Bluewater program collects a broad range of residential materials, including newspaper, clear and coloured glass, food and beverage cans, mixed plastics, aluminum foil containers, corrugated cardboard, magazines and telephone books.

Bluewater Recycling is also active in the commercial/institutional and industrial sectors, collecting Blue Box materials, in addition to corrugated cardboard, fine paper and telephone books from local businesses. The program also offers waste audits and promotes waste exchange.

Dry recyclables from all sectors are transported to the Grand Bend central processing facility. Centralized material handling has provided the economies of scale necessary to purchase processing equipment such as a magnetic separator, a horizontal baler, and conveyor belts for sorting.

The program is now expanding into composting. To date, about 3,000 households have been provided with backyard composters and efforts are under way to develop municipal-scale composting for food and organic wastes from restaurants and other commercial sources. Some organic waste from these sources is already diverted to area farmers for animal feed.

Bluewater's co-operative approach has been the key to market development- with centralized storage

and processing, the program has been able to ship materials cost-effectively to established markets in major cities. Further, program managers have aggressively developed new markets, such as using shredded paper for animal bedding. As a result, some secondary materials processors and end-users are considering locating in the Bluewater service area.

Overall, Bluewater Recycling convincingly demonstrates that rural recycling and composting can be both highly efficient and cost-effective. In 1989 the co-operative diverted an average of more than 38 percent of the local solid waste stream from the landfill. This successful co-operative endeavour continues to expand, gaining new members and launching new recycling and composting initiatives.

For additional information contact:

Francis Veilleux
Bluewater Recycling
PO Box 1330
Grand Bend, Ontario, N0M 1T0

Manitoba's Beverage Container Buy-back Depots

Manitoba Soft Drink Recycling Inc. (MSDR) operates a type of recycling program rare in Canada - a voluntary, non-deposit buyback system for soft drink containers. MSDR collects aluminum and plastic (PET) soft drink containers through a two-tiered system.

***The first tier* involves both permanent redemption centres and mobile recycling units which travel the City of Winnipeg and other parts of the province on a regular schedule. The "recylomobiles" are positiond at grocery stores, shopping malls and other locations where soft drinks are sold. Some 20 locations in Winnipeg and another 13 locations in rural communities around the province are served in this manner.**

***The second tier* involves donation depots established by non-profit organizations which accept containers in communities not serviced regularly by a recyclomobile or permanent redemption centre. Containers are redeemed through MSDR.**

MSDR also provides direct collection services to community groups, non-profit organizations and selected individuals such as senior citizens. In all, more than 500 non-profit groups participate in the program. Participants are paid on a per-pound basis, and prices reflect the intrinsic value of the materials.

MSDR maintains an active promotion program and has extended collection services to include schools and universities. MSDR is also beginning to work with pilot municipal curbside recycling programs in the province, providing technical support and markets for soft drink container materials.

The MSDR program shows how a specialized buy-back recycling service can operate successfully, in both urban and rural communities. Although administered by the private sector as opposed to municipalities, the program has had a major impact on local awareness and participation in recycling.

For additional information contact:

Lance Morrison
MSDR 1-20 Bentall St.
Winnipeg, Manitoba R2X 3A8
(204) 694-5349

Volunteer Drop-off at Work in Rural Nova Scotia

In February 1989, a volunteer committee set up Riverlake Recyclers to serve the rural communities of Wellington, Fletcher's Lake, Windsor Junction, Lakeview and Fall River, approximately 35 kilometres from Halifax, Nova Scotia.

A monthly drop-off at a local high school now collects aluminum and tin cans, glass, plastic (LDPE) bags, corrugated cardboard, newspaper and computer and bond paper. This drop-off presently serves approximately 2,000 households, with collection on the second Saturday of every month. Approximately 10 percent of the households served participate in the program.

Environmental awareness through public education is a primary goal of the committee. This is achieved through one-on-one contact at the monthly drop-off and through presentations to local community groups and schools. Promotional methods include distributing flyers, posting signs in high visibility locations, advertising in local community newspapers and making public service announcements during community radio time.

Participants are asked to clean and prepare their materials for drop-off (e.g. cans flattened, containers rinsed, etc), although the materials are still inspected at the site. Under the supervision of committee members, volunteers from local non-profit community groups (e.g., Girl Guides, Boy Scouts, PTA etc.) sort materials. In return, these groups receive the proceeds from material sales, usually ranging from $90 - $150 per collection. The materials are either transported to a local clearing house using a donated truck, or picked up by buyers.

Despite its success to date, the future of the rural drop-off is unclear. Its voluntary approach is less capable of handling fluctuations in markets than municipal recycling programs. (Most volunteer drop-

offs in Nova Scotia recently stopped taking newspapers, for example.)

While the City of Halifax is starting a Blue Bag curbside residential program for collection of glass, aluminum and newspaper for urban areas, it has not yet decided what approach will be taken in surrounding rural areas.

Halifax County, where the communities involved in the Riverlake Recyclers Committee are located, is uncertain at this point what kind of recyling program will be implemented.

For additional information contact:

Susan Hawkins
Riverlake Recyclers
Site 7, Box 28, R.R. #1
Windsor Junction,
Halifax County, Nova Scotia B0N 2V0
(902) 861-1009

Region of Peel Pioneers Commercial Recycling

In Ontario, a comprehensive industrial and commercial/institutional (ICI) waste diversion program has reaped impressive results for the Region of Peel: the Region diverted 50,670 tonnes and 67,700 litres of ICI wastes from landfills and sewers in 1989 alone, through programs for source reduction, re-use and recycling.

Free waste audits for local businesses are an integral part of Peel's commercial program. These audits identify what is in a company's waste stream and opportunities for both reducing and recycling it.

One option is to redirect a specific waste material to another company which can re-use it as an input to its own operations - a transaction known as "waste exchange".

In 1990, 147 commercial audits were conducted and 8,127 tonnes of material were diverted from disposal through the waste exchange program. (This figure did not include materials banned from disposal.)

Material disposal bans have also been another effective tool for Peel. The Region currently forbids the disposal of tires, old corrugated cardboard (OCC), wood and drywall at the local landfill.

In 1990, Peel's disposal bans resulted in the diversion of 5,857 tonnes of tires, 47,674 tonnes of OCC, 45,323 tonnes of wood, and 1,700 tonnes of drywall from the landfill.

These bans are enforced through violation notices, surcharges, site visits, and suspension of landfill use privileges.

Materials targeted for bans were selected only after determining that markets for these materials were sufficiently established.

Active market development was required for some targeted materials. As a result, new ventures which moved into or near the region include WCI Wood Conversions, Inc, a wood processing facility, and New West Gypsum, a drywall recycling facility located in

the Region of Halton.

The Region has been careful to advertise and promote its disposal bans to the commercial sector. It has issued bulletins to local businesses, haulers, trade boards and industrial associations, as well as distributed reminder notices at the landfill.

In conjunction with the City of Mississauga, the Region has also initiated a pilot fine paper recycling project with local businesses which are too small to qualify for regular pickup by a hauler. The Region supplies the recycling bins, boxes and desktop containers. The program is conducted by the City of Mississauga's Blue Box contractor.

The Region and the City of Mississauga are also sponsoring joint pilot collection of glass, bottles and cans from 10 local restaurants and cafeterias.

Peel's schools are also recycling fine paper and beverage cans. The regional school boards formed a central joint recycling committee which, with the co-operation of local municipalities, collects from a number of the Region's schools.

To help sustain its commercial program, the region sponsors an Industrial Waste Reduction Seminar every year. During the course of the seminar, the Region presents awards to industries, associations and individuals in recognition of their outstanding contributions to waste reduction.

Another way the Region promotes its involvement in commercial waste reduction is through the sale of an attractive poster.

For additional information contact:

Karen Holt
10 Peel Centre Drive
Brampton, Ontario L6T 4G4
(416) 791-9400

Edmonton's Booming Blue Box Program

In Alberta, the City of Edmonton boasts a comprehensive curbside collection program with an outstanding participation rate and significant waste diversion.

This program incorporates more types of recyclable materials than any other curbside program in North America.

Inaugurated in 1988, the City's recycling program features the well-known Blue Box which is distributed to participating households. To increase participant convenience, collection is provided weekly on the same day as garbage collection. The voluntary program serving 134,470 households throughout the entire city claims an average monthly participation rate of 90 percent and diversion of 12.5 percent of the local residential waste stream.

This is in a province which already has an established deposit/buy-back system for beverage containers. The estimated collection cost is $28 per household per year. City officials project that this cost will decrease with its next collection contract

Edmonton is particularly noted for the number of recyclable materials included in its program. Residents are encouraged to set out glass bottles and jars, tin cans and certain types of scrap metal, newspaper and inserts, magazines and catalogues, cardboard boxes, boxboard (e.g. cereal boxes), polycoated milk cartons, shoe boxes, brown paper bags, and mixed plastics.

Edmonton is the first city of its size to collect milk cartons. Residents place newspapers in a plastic grocery bag on top of the Blue Box and put plastics in another bag clipped to the corner of the box. All other materials, including the caps and lids from the glass and plastic containers are placed in the Blue Box.

Edmonton's recycling collection and processing is performed by two private contractors - Browning-Ferris Industries (BFI) and The Edmonton Recycling

Society, a non-profit organization which hires disadvantaged workers for its processing operations.

The City's promotion activities include in-school presentations, brochures and fact sheets. The program has its own mascot - Michael Recycle - who has been in such high demand in city classrooms and at social events that he's worn out his costume!

In 1990, Edmonton launched the next phase of its residential recycling program: a pilot multi-family collection project. Participants were given a Blue Box or a half-size mini-Blue Box to be emptied into five or ten central bins, depending on the size of the complex. The program serves 2,862 households in 27 different types of multi-family housing.

For additional information contact:

Lloyd Egan
City of Edmonton
Waste Management Branch
2nd Floor, Century Place
9803 102 A Avenue
Edmonton, Alberta T5J 3A3
(403) 496-5657

Blue Bag Brings Commingled Recycling to Québec

In Québec, Notre-Dame-des-Prairies (pop. 7,000) is one of the first municipalities in Canada to test a new approach to curbside residential recycling collection: the Blue Bag. By requiring participants to place their commingled recyclables in a single collection container, the Notre-Dame-des-Prairies program achieves time and cost savings not possible in curbside programs with more elaborate source separation and collection requirements. The Blue Bag has also made it simpler and less complicated for residents to become involved in recycling collection.

Initiated in the fall of 1989, the Notre-Dame-des-Prairies program is built around the use of a translucent blue (LDPE) plastic bag marketed by First Brands (Canada) Corporation. City officials were attracted to the concept, in part, because of the ability of their contract hauler to use an existing garbage truck to collect the bagged materials, avoiding the expense of purchasing new equipment. In addition, they anticipated that program efficiencies would result from the quick collection times made possible by the use of bags, while participation would be boosted due to the convenience of placing all materials in a single container.

Their expectations were correct. Since its inception, the Notre-Dame-des-Prairies program has sustained an average waste diversion rate of approximately 18 percent or 6,000 kg. per week for the municipality's 2,600 households. Three materials - newspaper, cardboard and glass - are currently collected; metals, plastics and leaves (in a separate bag) may be added when markets can be identified. The program requires more extensive back-end processing for the post-collection sorting of materials and bags. However, most of the sorting is mechanical, including a device designed to separate bags from the rest of the materials. Bags are recycled by the manufacturer and used in the fabrication of value-added plastic products, currently including garbage bags and ice scrapers.

Local residents are impressed with the convenience of bagged, commingled recycling. The Blue Bag fits easily into a kitchen environment where it promotes consistent recycling behaviour. Residents purchase their own bags, but this expense is offset in part by the decreased need for standard garbage bags. Bags can be cinched tight when full and do not have to be returned to the household in the evening like other types of containers. According to Mayor Alain Larue, these factors help account for a diversion rate that more than doubles those of comparable curbside recycling programs in Québec. The program has also become a source of civic pride.

Other towns in Québec are currently studying Notre-Dame-des-Prairies' Blue Bag program to judge its success. Some are also investigating an alternative approach to commingled recycling, i.e. the use of a single roll-out collection bin. A roll-out would retain the collection advantages of commingled recycling, but promote the use of a durable, non-disposable container. Purchase of such bins, however, could add significant up-front program costs - either for the municipalities or participants themselves.

For additional information contact:

Yves Poirier
Municipalité de Notre-Dame-des-Prairies
225, boul. Antonio Barette
Notre-Dame-des-Prairies, Québec
J6E 1E7
(514) 759-7741

Evaluating Backyard Composting in Newcastle

While a number of Canadian municipalities have begun to promote backyard composting in recent years, the municipality of Newcastle (Region of Durham, Ontario) recently studied the actual waste diversion potential, cost-effectiveness, and homeowner acceptance of backyard composting in a pilot composting program. The Newcastle program was supported by a number of sponsors, including the Ontario Ministry of the Environment, the Regional Municipality of Durham, and Garbage of Ontario Diminished (GOOD) - a citizen's advocacy group.

Between September and December 1989, sixty households in Newcastle were provided with one of three different brands of home composting units for the research project. Residents were trained in the use of the composting units and provided with instructions for monitoring their unit's performance. Over the next four months, the households composted organics, including food and yard waste in their respective units.

The results of the Newcastle program were impressive. On average, the sixty composting units diverted 28 kilograms of organic waste per household per month from the municipal waste stream, resulting in a 32 percent reduction of all residential waste for participating households. Even though the study was conducted during a period of heavy yard waste generation, over two-thirds of the waste diverted was food waste, suggesting significant year-round potential for backyard composting in Newcastle.

An analysis of the program estimated the amortized cost of backyard composting to be $18.75 per tonne, substantially lower than the cost of collection alone (estimated at between $40-60 per tonne) for other major solid waste management alternatives, including centralized recycling, municipal composting, incineration, and landfilling. Actual back-end costs of those alternatives would raise their cost per tonne

estimates significantly. In short, with a modest initial capital outlay and ten year amortization, backyard composting was rated as a highly effective, financially attractive alternative for municipal waste diversion.

While 60 percent of participating households identified that they had experienced some technical difficulties with their composting units, all agreed that they would continue to compost in their backyards. Similarly, all of the participants were prepared to recommend backyard composting to their neighbours and friends.

The Newcastle study demonstrated that backyard composting has significant waste reduction potential at a considerably lower cost. However, it only resulted in the placement of a small number of composting units in local households. To have a genuine impact on the local waste stream, a plan to place more units will have to be devised.

Interestingly, when Metropolitan Toronto sold 18,000 "Soilsaver" composters on a first-come, first-serve basis at a fraction of their actual retail cost in 1989, literally thousands of backyard composting enthusiasts were left waiting for the next "giveaway". Apparently, the public is ready and willing for more opportunities to reduce waste in their own backyards.

For additional information contact:

Works Department
The Regional Municipality of Durham
Box 623, 105 Consumer's Drive
Whitby, Ontario, L1N 6A3
(416) 668-7721

B.C. Funds Municipal Source Reduction and Recycling

British Columbia has set a goal of reducing the municipal solid waste stream 50 percent by the year 2000, through a combination of source reduction, reuse, and recycling. Under a new provincial program, municipalities and regions are now responsible for developing long-range solid waste management plans, as well as the development of procurement policies favouring recycled materials, Blue Box recycling programs, and composting programs.

To assist municipalities in attaining the 50 percent diversion goal, the provincial government has established a number of financial assistance progams. Municipalities are encouraged to apply for financial assistance in the following program areas:

- **Multi-material recycling**
- **Rural waste management (a joint application with private or non-registered non-profit group is required)**
- **Public education and information**
- **Litter control**
- **Recyclable goods transportation**

Under this system, provincial assistance will cover a portion of the capital and other start-up costs for such programs. For example, the Public Education and Information Financial Assistance Program allows for cost-shared contributions of 30 percent of capital costs and 30 percent of short-term operating costs.

To date, provincial financial assistance in B.C. has been used by municipalities for a number of different progams, including Blue Box programs, composting programs, drop boxes, installation of rural transfer stations, auto hulk and white goods clean-up programs, oil barrel clean-up, litter containers, compost demonstration gardens, an environmental education exhibit and a composting video.

Municipal financial assistance programs similar to British Columbia's program are also available to

municipalities in Ontario (through Ontario Multi-Material Recycling, Inc.), in Québec (through Collecte sélective Québec) and in Nova Scotia.

For additional information contact:

Leslie Sullivan
Manager, Marketing and Enterprise Development
Municipal Solid and Biomedical Waste Branch
Environmental Protection Division
Ministry of Environment
1312 Blanshard Street, 5th Floor
Victoria, British Columbia, V8B 1X5
(604) 356-9971

Notes

4 Program Development: Contacts & Other Sources

Program Contacts

Provincial Waste Management Departments

Alberta
Department of the Environment
Environmental Protection Services
Wastes and Chemicals Division, Recycling Branch
Oxbridge Place, 9820 - 106 St., 5th floor
Edmonton, Alberta T5K 2J6
(403) 427-5838

British Columbia
Ministry of Environment
Parliament Buildings, Victoria, B.C. V8V 1X5
Recycling Hotline (Vancouver): (604) 732-9253

Manitoba
Manitoba Environment
960 - 330 St. Mary Avenue,
Winnipeg, Manitoba R3C 3Z5
(204) 945-8443 Toll-free: 800-282-8069

New Brunswick
Department of the Environment
Environmental Protection Branch
Sanitary Engineering Section, P.O. Box 6000
Fredericton, New Brunswick E3B 5H1
(506) 453-2861

Newfoundland
Department of Environment and Lands
Environmental Investigations Division
P.O. Box 8700, West Block, 4th Floor
St. John's, Newfoundland A1B 4J6
(709) 576-3394

Northwest Territories
Department of Renewable Resources
Pollution Control Division
P.O. Box 1320
Yellowknife, Northwest Territories X1A 2L9
(403) 920-7654

Nova Scotia
Department of the Environment
Resource Management and Pollution Control Division
Recycling Coordinator, P.O. Box 2107
Halifax, Nova Scotia B3J 3B7
(902) 424-5300

Ontario
Ministry of the Environment
Waste Management Branch,
Municipal Waste Support Programs
14th Floor - 2 St. Clair Avenue West
Toronto, Ontario M4V 1L5
(416) 323-5243

Waste Reduction Advisory Committee (WRAC)
P.O. Box 2112
9th Floor, 119 King St. W.
Hamilton, Ontario L8N 3Z9
(416) 521-7578

Prince Edward Island
Department of the Environment and Tourism
Environmental Protection Branch
P.O. Box 2000
Charlottetown, Prince Edward Island C1A 7N8
(902) 368-5000

Québec
Ministère de l' Environnement
Direction de la récupération et du recyclage
2360, Chemin Sainte-Foy, 1er étage
Sainte-Foy, Québec G1V 4H2
(418) 643-4115
(418) 643-3754 télécopieur

Saskatchewan
Department of the Environment and Public Safety
Air and Land Protection Branch
Waste Reduction Unit
3085 Albert St.
Regina, Saskatchewan S4S 0B1
(306) 787-6209

Yukon Territory
Department of Renewable Resources
Information and Education Officer
P.O. Box 2703
Whitehorse, Yukon Territory Y1A 2C6
(403) 667-5237

National and Provincial Recycling Organizations

Alberta
Recycling Council of Alberta
P.O. Box 2100, Station M (#27)
Calgary, Alberta T2P 2M5
(403) 471-0071

British Columbia
Recycling Council of British Columbia
102 - 1525 W. 8th Ave.,Vancouver, B.C. V6J 1T5
(604) 731-7222
(604) 732-9253 (information line - Greater Vancouver)

Manitoba
Recycling Council of Manitoba
412 McDermott Ave.
Winnipeg, Manitoba R3A 0A9
(204) 942-7781

Nova Scotia
Clean Nova Scotia Foundation
1615 Bedford Row, P.O. Box 2528, Station M
Halifax, Nova Scotia B3J 3N5
(902) 424-5245

Ontario
Recycling Council of Ontario
489 College St., Suite 504
Toronto, Ontario M6G 1A5
(416) 960-0938 (Ontario Recycling Information Service)
or 800-263-2849

Industry and Trade Associations

Canadian Association of Recycling Industries (CARI)
50 Gervais Drive, Suite 502
Dons Mills, Ontario M3C 1Z3
(416) 510-1244

Canadian Soft Drink Association
Manager, Environmental Affairs
55 York St., Suite 330
Toronto, Ontario M5J 1R7
(416) 362-2424

Canadian Tinplate Recycling Council
100 King St. W., P.O. Box 2030
Hamilton, Ontario L8N 3T1
(416) 521-1375

Environment and Plastics Institute of Canada (EPIC)
Society of the Plastics Industry in Canada (SPI Canada)
1262 Don Mills Road, #104
Don Mills, Ontario M3B 2W7
(416) 449-3444

Solid Waste Association of North America (SWANA)
[formerly Government Refuse Collection and Disposal Association, Inc. (GRCDA)]
Canadian Representative:
Steve Gyorffy, Director of Operations
City of Kitchener, P.O. Box 1118
Kitchener, Ontario N2G 4G7

SWANA Headquarters :
P.O. Box 7219
Silver Spring Maryland USA 20910
(301) 585-2898

Manitoba Soft Drink Recycling Inc.
1 - 20 Bentall St.
Winnipeg Manitoba R2X 3A8
(204) 694-5349
(204) 694-5352 (Information Hotline)

Nova Recycling 1990 Ltd.
616 O'Connell Dr.
Cornerbrook, Newfoundland A2H 7G4
(709) 785-7286

Ontario Multi-Material Recycling Inc. (OMMRI)
Scotia Bank Plaza
40 King Street West, Suite 3005
Toronto, Ontario M5H 3Y8
(416) 594-3456

Saskatchewan Association of Rehabilitation Centres (SARCAN)
140 Avenue F North
Saskatoon, Saskatchewan S7L 1V8
(306) 933-0616

Other

Canadian Environmental Law Association (CELA)
517 College Street, 4th Floor
Toronto, Ontario M6G 1A8
(416) 960-2284

Environmental Action Foundation
Solid Waste Alternatives Project
1525 New Hampshire Ave N.W.
Washington, D.C. USA 20036
(202) 745-4879
(The EAF focus is primarily on waste reduction.)

Other Resources

Information Resources

The following information resources are a sample of the publications available on recycling. All subscription prices are in Canadian dollars unless otherwise noted.

BioCycle: The Journal of Waste Recycling
JG Press Inc., Box 351, Emmaus, PA USA 18049.
$75.00 U.S.
Magazine with a broad range of articles on recycling with special emphasis on composting.

Ecosource
Box 1270, Guelph, Ontario N1H 6N6.
$350.00.
A compilation of environmental articles, news briefs from a variety of sources.

Environmental Decisions
National League of Cities, 1301 Pennsylvania Avenue, N.W., Washington, D.C. 20004.
Free. Publication written for municipal employees about environmental issues, including waste management and recycling.

Recycling Canada
Sydenham Publishing
459-13th St. W., Owen Sound, Ontario N4K 3W8
$99.00.
Monthly newsletter covering recycling news and issues across Canada.

Environmental Eye
Businesstek Publications Inc.,
P.O. Box 11125, Stn H, Nepean, Ontario K2H 7T8.
$125.00.
Monthly newsletter on environmental developments within Canada.

Ontario Recycling Update
Recycling Council of Ontario,
459 College Street, Toronto, Ontario M6G 1A5.
Update included with membership.
Provides information about recycling activities within Ontario as well as national and international recycling news.

Recycling Times
National Solid Waste Management Association
Suite 1000, 1730 Rhode Island Avenue, N.W
Washington, D.C. USA. 20036-3196.
$95.00 U.S.
Newspaper-style publication providing timely articles on recycling subjects, including industry news and pending legislation.

Resource Recycling
P.O. Box 10540, Portland, Oregon USA 97210
$51.00 U.S.
Journal containing in-depth articles on recycling subjects. Includes articles on legislative trends, emerging technologies, collection and separation systems and many other subjects.

Warmer Bulletin
The Warmer Campaign, 83 Mount Ephraim,
Royal Tunbridge Wells, Kent UK TN4 8BS.
Free.
Provides information on global recycling and incineration programs with particular emphasis on the United Kingdom and Europe.

Wastelines
Environmental Action Foundation,
1525 New Hampshire Ave., N.W.
Washington, D.C. U.S. 20036.
$12.25 U.S.
Waste management information from an environmentalist perspective.

Basic Bibliography

BioCycle Guide to Collecting, Processing and Marketing Recyclables
Edited by the staff of BioCycle.
Emmaus, PA: The JG Press, Inc., 1990.

Recycling of Waste in Alberta: Technical Report and Recommendations
Environment Council of Alberta.
Edmonton: The Council, 1987.

Coming Full Circle: Successful Recycling Today
Environmental Defense Fund.
Washington, D.C: The Fund, 1988.

Why Waste a Second Chance: A Small Town Guide to Recycling.
National Association of Towns and Townships.
Washington, D.C: The Association, 1989.

Recycling Technology Manual
Ontario Recycling Advisory Committee.
Hamilton, Ontario: The Committee, 1988.

A Decision-Maker's Guide to Solid Waste Management
United States. Environmental Protection Agency.
Washington, D.C: The Agency, 1990.

The Solid Waste Dilemma: An Agenda for Action
United States. Environmental Protection Agency.
Washington, D.C: The Agency, 1989.

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The Honourable J. Glen Cummings *Minister of the Environment, Government of Manitoba*
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1 Nicholas Street, Suite 520, Ottawa, Ontario, K1N 7B7
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The National Waste Reduction Handbook

Waste Reduction has become a major concern for Environment Ministers across Canada. They have established a solid waste disposal reduction target of 50% by the year 2000. However, the main burden of this waste management task will fall on municipalities.

This handbook, produced by the National Round Table on the Environment and the Economy, with participation by the Federation of Canadian Municipalities, is designed to assist municipal decision makers in successfully meeting that goal.

It explores the options for source reduction, recycling and composting, examines the markets, the costs and the benefits involved, and provides some waste reduction success stories which show just how much progress is already being made.

NATIONAL ROUND TABLE SERIES
ON SUSTAINABLE DEVELOPMENT

Preserving Our World
Sustainable Development: A Manager's Handbook
The National Waste Reduction Handbook
Decision Making Practices for Sustainable Development
On the Road to Brazil: The Earth Summit
Aussi disponible en français

National Round Table on the Environment and the Economy
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1 Nicholas Street Suite 520 Ottawa Ontario K1N 7B7

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